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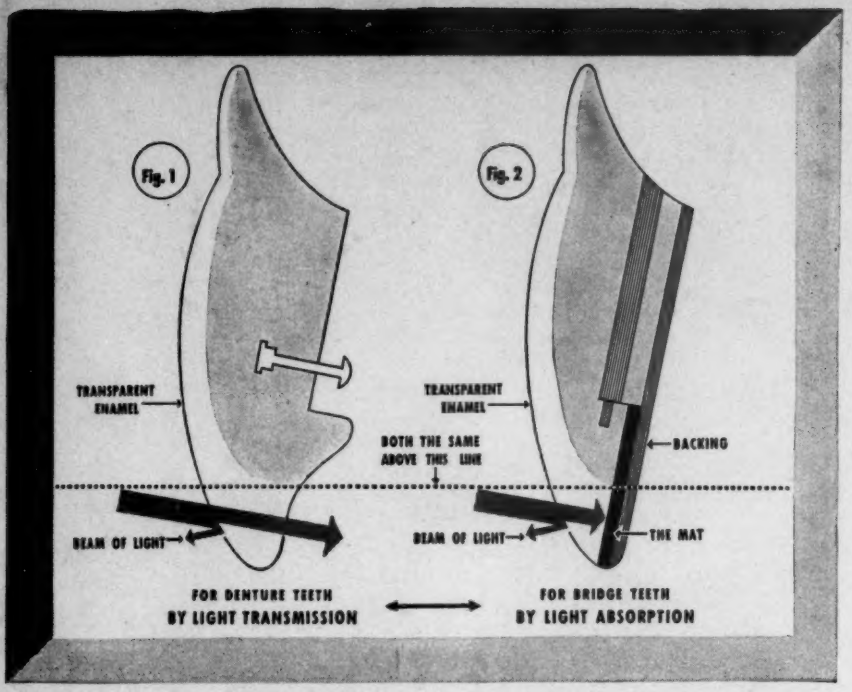

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SYMPOSIUM ON PROBLEMS OF AVIATION DENTISTRY

*Army Air Forces Dental Research Group**

Many dentists have belittled aviation dentistry, saying that "good dentistry" will eliminate its problems. At the other extreme, some enthusiasts have claimed for aviation dentistry a place beside the established specialties of prosthodontia, periodontia and exodontia. Others have intimated that with the end of the war the problems of aviation dentistry ceased to be of importance; they consider it a military problem of little significance to the clinicians in everyday practice. Truly, the scope and the significance of aviation dentistry have not been adequately evaluated, for this field has far-reaching possibilities as a new investigative method and as a clinical entity in everyday practice.

The Army Air Forces were among the first to recognize that flying brought a challenge to dentistry. When our expanding air force was training thousands of aviation cadets, it became apparent that dental difficulties were a common complication of exposure to decreased barometric pressure in the decompression chamber. At that time, the Office of the Air Surgeon, through the dental chief, Col. George R. Kennebeck, dispatched letters to the altitude training units requesting information on the reaction of dental tissues to simulated high altitude and emphasizing the need for the compilation of comprehensive data.

In December 1943, a dental questionnaire was sent to 200 army air bases. The questions were designed to determine the scope and the relative importance of dental problems among flying personnel. The dental officers responsible for the most comprehensive replies were selected to form the Army Air Forces Dental Research Group. In the following two years, various studies were allocated to the members of the group; two conferences were held to correlate findings and disseminate information; and a number of articles were published in military and civilian journals. The faculties of many universities were consulted on numerous occasions. A few leading dental authorities quickly realized the value of aerodontia studies, and these

Presented as a round-table discussion at the Eighty-First Midwinter Meeting of the Chicago Dental Society on February 12, 1946.

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men directed and supplemented the work of the Army Air Forces Dental Research Group.

Aviation Medicine

An elementary introduction to some aspects of aviation medicine[1, 2] is essential for correlation with problems of aviation dentistry. In flight, apart from emotional stress, airmen are subject to three environmental changes of great physiologic significance: (1) changes in atmospheric pressure; (2) changes in temperature; (3) motion at high speed in space. To overcome the handicaps imposed by nature on an organism "designed" for terrestrial life, compensatory mechanisms of the body must be taxed and artificial aids must be employed in making the necessary adjustments to fly at altitude.

The following discussion of physiopathologic flying disorders is limited to those relevant to this paper.

Anoxia or Oxygen Deficiency.—As altitude is increased, the oxygen partial pressure decreases, and therefore the blood absorbs less oxygen. The first and principal effect of oxygen deficiency is a change in the highest mental capacities, attention and judgment. Ironically, the flyer loses his capacity to judge to what extent he is already suffering from anoxia. Thought and memory processes, vision, muscular control and respiration are affected. If oxygen deficiency continues, unconsciousness intervenes; and, if not soon relieved, prolonged anoxia results in permanent injury and death.

Effects Due to Entrapped Gases.—Gases enclosed in body cavities, from which escape is not readily available, expand as a result of any decrease in atmospheric pressure. Some degree of abdominal distension from the expansion of intestinal gases at altitude is almost universal; colic pain is not so frequent and is usually transitory. Although the middle ear cavity and the paranasal sinuses are in communication with the outer air by passages which end in the nose or nasopharynx, the communication is often insufficient or interrupted. During rapid ascent an adequate equalization of pressure usually occurs owing to the relatively increasing inner pressure which opens the passage; but during descent the rapidly increasing outer pressure serves to close the openings in a valve-like manner. The discomforting syndromes which arise have been respectively termed aero-otitis media and aerosinusitis.

Decompression Sickness.—This symptom complex includes bends, chokes, skin reactions, neurologic symptoms and circulatory reactions. These reactions may or may not occur concurrently. Bends, the most common manifestation of decompression sickness, is characterized by pain in the extremities. This pain is of a deep, boring character at times so severe as to become intolerable. Chokes is characterized by substernal pain, a nonproductive cough, deep breathing and dyspnea accompanied by a sense of suffocation and apprehension. Numerous and varied skin reactions occur, including edema, erythema, paresthesia, subcutaneous emphysema and tingling sensations. Neurologic symptoms involving any part of the central nervous system occur, but are relatively infrequent. Circulatory reactions of several types and of all grades of severity occur usually secondary to bends, chokes or gas pains, and occasionally in the absence of such symptoms. The most widely accepted theory concerning the etiology of decompression sickness is the gas bubble theory. At high altitudes the pressure of nitrogen in solution in the body fluids becomes greater than that of atmospheric nitro-

1. Armstrong, H. G.: Principles and Practice of Aviation Medicine. Ed. 2. Baltimore: Williams and Wilkins Company, 1943.

2. Headquarters, Army Air Forces: Physiology of Flight. AAF Manual No. 25-2. Washington, 1945.

gen; when ascents, especially at a rapid rate, are made to 20,000 feet or more, usually 30,000 feet, the nitrogen tends to come out of solution and to form bubbles. On the basis of present evidence, bends pain is attributed to extravascular gas bubbles in the connective tissues about joints, bones, nerves and muscles; chokes appears to be due to miliary gas emboli in the pulmonary circulation. It must be emphasized that the gas bubble theory falls short of explaining all the clinical observations and experimental findings.

Cold at Altitude.—With increasing heights above sea level, the temperature of the air drops approximately 2° C. per 1,000 feet. Exposure to, or inadequate protection from, cold at high altitudes results in serious injury and physical suffering.

Effects of Centrifugal Forces.—When planes turn or climb upward, the occupants are pressed into their seats by centrifugal forces. These positive accelerations, acting in the direction of the head-to-seat axis of the body, produce effects which vary with the magnitude of the acceleration, the rates at which it is increased and decreased and the duration of its action. For the purpose of this paper, we need only be concerned with the positive accelerations usually encountered in military and civilian aircraft. The principal subjective sensations are an awareness of increased pressure on the body and heaviness of the hands and feet. The centrifugal force causes the blood to move away from the head, resulting in diminution or complete loss of vision, commonly known as "blacking out." Increased muscle tension is recommended to prevent, to some extent, the flow of blood from the head.

Scope and Significance

Exposure to high altitudes sometimes causes toothaches which are not experienced on the ground. Toothache at altitude, termed aerodontalgia,[3] put dentistry in the war news, but it is only one of many interesting problems in the relation of altitude and flying to dentistry. Attention has been called to problems in periodontia, oral surgery, prosthetics, occlusion and caries. Most observations in aviation dentistry have arisen as a result of military operations. Some problems will remain applicable only to military personnel; others, however, will affect the future flying public.

When a few airmen were flying at high altitudes, their problems were of concern to a few physiologists interested in the basic principles of aviation medicine. Now, with the advent of the air travel era, reactions to flight conditions are of concern to all clinicians. An understanding of the dental phases is essential to all dentists. Flight conditions are subjecting diagnostic procedures, operating methods and dental materials to new critical tests. The dental profession must accept the challenge to deal with problems of modern flying by assisting in conditioning the body to withstand the demands of the new environment and by offering effective corrective treatment of dental difficulties encountered in flight.

This, however, is only one phase of the significance of aviation dentistry. Studies on the relation of altitude to dentistry are a means to a greater end than just treating dental conditions arising from exposure to this new environment. Research in aviation dentistry is destined to influence everyday procedures in the dental office.

The problems of aviation dentistry are apparently the same as those experienced in general practice. Toothaches, periodontal disturbances, mandibular malposition, etc., are basic problems in dentistry. However, in aviation dentistry, these basic problems are studied as they arise

3. Mitchell, D. F.: Aerodontalgia. Bul. U. S. Army M. Dept., No. 73, p. 62, February 1944.

from exposure to a new set of environmental conditions, which elicit reactions of the same general character as those arising under normal conditions but at different levels or thresholds and through unique activating mechanisms. In aviation dentistry, therefore, we have a tool—a new method for studying dental physiology and disease.

To be more specific, we will discuss pulp diagnosis. It is no longer adequate to describe the pulp as being merely "dead or alive." The pulp may be sick, and, like sick patients, some pulps recover and some are beyond help. After correlating the clinical and histopathologic findings of teeth which have caused pain at altitude, the investigator realizes that, by present-day methods, it is practically impossible to make an accurate clinical diagnosis of the condition of the dental pulp. A certain percentage of clinical failures await the operator who selects sick teeth for restorations or as abutments. Sick pulps often become painful at high altitudes. Knowledge of the condition of the pulp would not only dictate the selection of the teeth for restoration or abutment use, but also would indicate the ideal time to institute conservative therapeutic treatment of sick pulps or the most advantageous time to begin root canal therapy in pulps judged hopelessly sick. The study of toothache occurring at altitude will bring us much closer to this goal: a rational basis for pulp diagnosis.

The cause of chronic aero-otitis media in some cases has been ascribed to malposition of the mandible, malocclusion, occlusal trauma or the loss of vertical dimension. Again, aviation dentistry encounters a time-worn problem in dentistry which needs clarification. The effects of ascent and descent offer a new method of studying whether temporomandibular dysfunction is in any way related to middle ear disturbances, and perhaps will shed some light on a very confused basic problem of dentistry and medicine.

New thoughts on the problem of denture retention have been aroused. Investigators[4] have found that at 30,000 feet there was a 50 per cent loss of retention of full dentures. These findings are at variance with certain accepted theories. Through the effects of altitude, we have a method of determining what part atmospheric pressure plays in denture retention.

Various sources in the air forces of many nations have reported a relatively high incidence of gingival disturbances among flying personnel. Although the etiologic factors usually related to periodontal disturbances appear to play the major role as causative agents, the relatively high prevalence of gingival disturbances in this select group justifies the search for other factors. The search for pathogenic factors in periodontal disease has for some time extended beyond the limits of the oral cavity. The role of systemic disorders and changes in the external environment have been advantageously investigated. The effects of flying offer a new set of conditions whose widespread sequelae in many tissues have been demonstrated by studies in aviation medicine. The effects of altitude on the tissues of the oral cavity offer new opportunities for research.

Moreover, the effects of altitude and flying in accelerating disease processes have been reported. In the pulp, it has been observed that altitude brings about an exacerbation of a subclinical disease which caused no symptoms on the ground, or an early revelation of symptoms which would eventually appear in the course of a pre-existing pathologic process. Aside from consequences which may appear in the normal periodontium, the effects of flying may be secondary

4. Snyder, F. C.; Kimball, H. D.; Bunch, W. B., and Beaton, J. H.: Effect of Reduced Atmospheric Pressure upon Retention of Dentures. J.A.D.A. 32:445, April 1, 1945.

etiologic factors in already existing periodontal disease.

Medicine has been aware for some time of the relation of emotions to illness, and has referred to psychosomatic factors in the etiology of disease. Psychosomatic factors, such as clamping and grinding habits associated with nervous tension, play a definite role in the high incidence of periodontal disturbances among airmen.

A review of the current investigations in aviation medicine will disclose that even the most popular theories on the etiology of decompression sickness fall short of explaining all the clinical observations and histopathologic findings. The pulp and the gingivae are readily available for biopsy in the study of aviation medicine. Here dentistry is offered an ideal opportunity to establish the value of dental tissues in medical research.

For further evidence of the scope of aviation dentistry, add to the phases given above the following studies: the role of decreased barometric pressure in the development of periapical lesions and in the dissemination of focal infection; the effects of decompression and oxygen breathing on the pH, flow and Lactobacillus acidophilus counts of saliva; a comparison of the caries index of aviation cadets, inexperienced trainees and experienced flyers; the development of dental identification records; drugs and filling materials evaluated by their effects on the dental pulps of animals exposed to high altitudes; studies on pulpal stimulation at altitude; the effects of mild anoxia on ascorbic acid metabolism and on the gingivae of guinea pigs.

Aviation dentistry may have its limitations as a clinical entity owing to the infrequent occurrence of dental difficulties in actual flight, especially in civilian aviation; but the field of aviation dentistry, as a tool in basic dental research on many phases of clinical dentistry, is worthy of extensive study.

Aerodontalgia

Aerodontalgia, or toothache at altitude, appeared as a problem when thousands of aviation cadets were exposed to simulated high altitudes in the decompression chamber. Numerous case histories from actual flights have been recorded. A few episodes occurred in combat resulting in disconcerting experiences and failure of the mission. In future commercial and civilian aviation, aerodontalgia will bring many patients from the airfield directly to the dental office, and the most common offenders at altitude are those teeth which have recently been worked on by the dentist.

Incidence.—The accompanying table, a composite of the complications resulting from the exposure of 83,720 trainees to simulated high altitude in the decompression chamber, reveals that toothache ranks fifth in frequency. No relation between toothache and other chamber reactions could be determined after a detailed study of a limited number (136) of the toothaches occurring in this series.[5] However, in a study of a larger series of cases (365), approximately 9 per cent of the aerodontalgia cases were associated with maxillary aerosinusitis. This will be discussed in greater detail later.

The severity of altitude chamber reactions can be judged by the number of reactions causing intolerable pain and descent before the completion of the "flight." Of 710 physiopathologic reactions to flight, 114 required premature descent. Toothache ranked third as the causative factor, preceded only by bends and gastro-intestinal pain.

Army air force stations, reporting on the altitude indoctrination flights in the decompression chamber of more than 100,000 men, indicated that 1 to 2 per cent suffer toothaches. The incidence of dental pain among eighty-seven civilian

5. Devoe, K., and Motley, H. L.: Aerodontalgia. D. Digest 51:16, January 1945.

Incidence of Complications Resulting from Exposure of 83,720 Trainees to Simulated High Altitude in the Decompression Chamber at Maxwell Field, Alabama, from July 1, 1943, to June 30, 1945

Type of Reaction	July 1, 1943-June 30, 1944		July 1, 1944-June 30, 1945		Total for Two Years	
	Number of Men Reacting	Per Cent of Men Exposed	Number of Men Reacting	Per Cent of Men Exposed	Number of Men Reacting	Per Cent of Men Exposed
1. Bends	8,081	13.00	826	3.83	8,907	10.64
2. Aero-otitis	4,886	7.86	1,754	8.13	6,640	7.93
3. Abdominal distress	2,486	4.00	123	0.57	2,609	3.11
4. Sinus pain	683	1.10	327	1.52	1,010	1.20
5. Toothache	635	1.02	161	0.74	796	0.95
6. Skin reactions	622	1.00	16	0.07	638	0.76
7. Vasomotor instability	205	0.33	29	0.13	234	0.28
8. Chokes	174	0.28	14	0.06	188	0.22
9. Anoxia	155	0.25	13	0.06	168	0.20
10. Visual disturbance	93	0.15	2	0.01	95	0.11
11. Hyperventilation	31	0.05	.....	.....	31	0.03
Total number of reactions	18,051	29.04	3,265	15.14	21,316	25.46
Total number of men exposed	62,160		21,560		83,720	

subjects was 5.8 per cent.[6] The lower incidence among military personnel was presumed to be due to their better-than-average dental health and to the reluctance of aviation cadets to divulge complications for fear of disqualifying from training.

Aerodontalgia cannot be adequately evaluated on the results of one or a few simulated flights in the pressure chamber. Pressure chamber experiences are at best only a substitute for actual flying experiences. Data based on the entire flying experience of many pilots present a more complete picture of the frequency and the significance of aerodontalgia. In response to a questionnaire and during interviews, 114 of 1,176 fighter pilots, 9.7 per cent, voluntarily submitted past or current case histories of aerodontalgia while flying. For clarification, all experiences of any one pilot were considered as one case history. On preliminary examination, this figure appears far out of proportion to the 1 to 2 per cent incidence of aerodontalgia reported from the decompression chambers. It must again be emphasized that this survey encompassed the entire flying experience of each pilot, not one pressure chamber flight.

If the incidence of aerodontalgia among these fighter pilots is considered with respect to their total flying time, the occurrence of toothache at altitude assumes diminutive proportions. The aggregate flying time of the 1,176 pilots was approximately 825,000 hours. During the years required to accumulate these hours in the air, only 114 pilots experienced aerodontalgia. During the two months these pilots were under observation, they flew approximately 75,000 missions or 100,000 hours and on these missions only twenty-three men reported toothache while flying. It is obvious that the incidence of aerodontalgia on a per flight basis is only a small fraction of 1 per cent.

It must be concluded that aerodon-

6. Pigott, J. P.: Dental Pain at High Altitudes: Origin and Treatment. C. A. M. Report No. 383. Washington: National Research Council, 1944.

talgia does not occur frequently in actual flight, because most difficulties were eliminated during training. However, many persons, in the course of years of flying, have experienced this inconvenience at some time in their flying careers.

Etiology.—The chief prerequisite for toothache at altitude, except in cases of referred pain, is the presence of some pre-existing pathologic disturbance of the pulp. The environmental changes associated with high altitudes may cause an exacerbation of symptoms previously experienced, or an accentuation of a subclinical pathologic process or an early revelation of symptoms which would eventually appear in the course of the pre-existing lesion. High altitude environment does not affect a normal pulp.

From an analysis of more than a thousand case histories, toothaches at altitude were conveniently grouped into three categories on the basis of the clinical findings:

Group I: Pain in teeth with irreparable damage to the pulp. The clinical pathologic findings included pulp destruction, very frequently associated with pulp exposure, and periapical lesions. Invariably the treatment in Group I cases was extraction or root canal therapy.

Group II: Pain in teeth with a reversible disturbance of the pulp. These disturbances have been attributed to a recently inserted filling or to a deep-seated filling without an underlying base. Some clinicians have reported that a defective filling, recurrent caries, hypersensitive dentin or a developing cavity caused toothache at altitude. In many cases, aerodontalgia occurred in teeth with apparently sound restorations. Group II cases were differentiated from the cases of pulp destruction in Group I by observation of the effects of treatment or further exposure to high altitudes. The Group II disturbances either responded to restorative treatment or did not recur after a few flights.

Group III: Pain referred to the teeth from aerosinusitis, aero-otitis, unerupted or partially erupted third molars or pericoronitis. Differences of opinion may arise as to whether referred pain should be classified with aerodontalgia. It is included here for completeness and convenience.

The most common offenders have been teeth with pulp exposures, recently inserted fillings and periapical disease. Reports indicate no significant difference in the etiologic factors between actual flight and decompression chamber findings.

Diagnosis.—The subjective symptoms of aerodontalgia are as varied as human symptoms can be, but a few generalized findings will serve as diagnostic aids. Sharp pain during ascent may indicate an acutely inflamed pulp; dull pain during ascent may indicate a chronically inflamed pulp; dull pain during descent directs suspicion to aerosinusitis. Pain which continues to ground level and persists on the ground may be referred from aerosinusitis or may disclose a tooth with periapical involvement. The cases with apical involvement may develop a cellulitis shortly after the flight. In general, the more acute the pulp disease, the lower is the altitude at which the pain occurs.

The localization of the tooth involved is usually difficult. The patient cannot always be relied upon to locate the exact source of the pain, although the quadrant involved can usually be defined. Roentgenograms of the suspected area should be taken, but should not be relied upon entirely in selecting the offending tooth. The electric pulp tester, sensitivity to hot and cold, percussion tests and examination for high spots on fillings are valuable aids. Prolonged pain from irritation with ice, as compared with the reactions of neighboring teeth, has been described[7]

7. Orban, Balint, and Ritchey, B. T.: Toothache Under Conditions Simulating High Altitude Flight. J.A.D.A. 32:145, February 1, 1945.

Fig. 1.—Roentgenogram showing a radiolucent cavity, with a radiopaque delineation resembling the lamina of the sinus, near the apices of the roots of the upper left second bicuspid and the first molar. During simulated descent, the patient had deep, intense, boring pain, located near the roots of the two teeth. Aspiration disclosed that the cavity, probably an accessory sinus, was temporarily closed. The pain may have been related to a partial vacuum developed in the cavity during descent.

as the most reliable clinical sign. A complete history should be taken, including age of the fillings, pain involved during the filling operation, post-filling reactions and any recent dental disturbances.

If diagnosis cannot be established after exploiting all diagnostic procedures, including a recheck flight, removal of suspected fillings and removal of decay are indicated. Careful examination should be made for minute exposures of the pulp horns. Recently filled teeth, even those with cement bases, may be the offenders at high altitudes. If one is certain that there is no pulp exposure, it is advisable to defer treatment until after a few additional flights. In many cases, the pain does not recur after one or a few flights. A recall of the patient for an interview and additional pulp tests after many flights constitute a more accurate checkup.

The use of zinc oxide and eugenol as a base distorts the true picture in some cases because its action on the pulp may conceal temporarily the effects of altitude. Histopathologic sections[7] of some teeth which were painful at altitude and rendered pain-free by the use of zinc oxide and eugenol show such extensive pulp damage that it is questionable whether the success of such treatment can be judged by the disappearance of painful symptoms. Undoubtedly, this form of treatment is indicated in some cases, but it is not a cure-all.

Differential Diagnosis.—Aerodontalgia also presents a problem in differential diagnosis.[8] Approximately 7 per cent of the aerodontalgia cases are attributable to maxillary aerosinusitis. This problem in differential diagnosis is most important to the clinician. Restorative or surgical treatment is not indicated in these cases.

If the openings in the maxillary sinuses are normal, air passes into and out of these cavities without difficulty during ascent and descent, thus assuring equalization of pressure at all times. Anatomic anomalies of the sinus cavity (Fig. 1) or obstruction of the maxillary ostia by swelling of the mucosal lining, caused by inflammation, allergy or redundant tissue, will impede the equalization of air pressure within the sinus with changing atmospheric pressure. A temporary partial vacuum or sudden equalization of sinus pressure with the exterior probably causes a stimulation of the dental nerves in close proximity to the base of the sinus. Pain from aerosinusitis usually occurs during descent, occasionally continues to ground level and, at times, persists after the flight. The pain may be localized in any of the upper posterior teeth, but the majority of the men suffer from constant or sporadic pain not necessarily localized in any one tooth. A few have burning or tingling sensations in the gums. The discomfort may be associated with frontal headache, infraorbital pain, numbness or a sensation of elongation of one or more teeth. A history of nasopharyngitis or sinusitis is often presented. Patients should be referred to the otolaryngologist for treatment. Subsequent flights will determine the accuracy of the diagnosis.

Elimination of Proposed Theories.—During ascent, the temperature decreases approximately 2° C. every 1,000 feet, and the low oxygen partial pressure requires the use of an artificial supply of oxygen above 10,000 feet. Before the advent of the oxygen mask, aviators used a pipestem mouthpiece from which issued a jet of extremely cold oxygen which impinged upon the teeth and mucous membranes. Frostbite of the cheek resulting from this has been described, so that one rapidly realizes why dental pain during flight was first attributed to low temperatures at high altitudes. Oxygen masks, some equipped with heaters, have replaced the pipe-stem, thus providing dispersion of the oxygen before inhalation.

Temperature as a factor in aerodontalgia was adequately covered by experiments performed in the Royal Air Force[9] and the Luftwaffe.[10] Thermocouples were inserted in oxygen masks, dental fillings and various places in the mouth and, at external temperatures down to —40° C., the temperatures at these loci were measured under varying conditions. The thermocouple readings never dropped below 20° C. during the experiments, and pain occurred only after ice water was introduced to reduce the tooth temperature to 12° C. The range of tooth temperature while flying is between 20° and 45° C., which is well within the limits occurring in everyday life. The teeth are normally well insulated by the cheeks, lips, tongue and saliva, and the standard equipment used in high altitude flights provides an additional measure of protection. These experimental results are supported by the fact that men in the coldest aircraft or in the most exposed positions are not those who complain of dental pain while flying. Except for temporary tingling sensations similar to those experienced on cold winter days, temperature merits no consideration as an activating factor in aerodontalgia.

8. Kennon, R. H., and Osborn, C. M.: Relation of Aerodontalgia to Aerosinusitis. Air Surgeon's Bul. 2:434, December 1945.

9. Harvey, Warren: Tooth Temperature with Reference to Dental Pain While Flying. Brit. D. J. 75:221, November 5, 1943.

10. Freitag, W.: Uber die Einwirkung der Kälte auf das Zahnsystem. Luftfahrtmedizin 7:335, 1943.

It has been suggested[11] that the dental pulp, owing to the valveless condition of its veins, is susceptible to blacking out as a result of centrifugal forces. Permanent damage to the tooth was implied because of the lack of any recoil mechanism whereby recovery could be complete and rapid. Reports from more than 1,000 fighter pilots, who on every flight are exposed to centrifugal forces, did not reveal any case histories which indicate that centrifugal force produces acute dental symptoms. A group of flyers from the Royal Norwegian Air Force, each with a high incidence of periapical abscesses, necrotic pulps, cavities, root canal fillings, impactions or periodontal disease, were exposed to accelerations in a human centrifuge equal to and more than those tolerated in flight. These experiments[12] failed to reveal subjective symptoms referable to the teeth. In view of the completely negative reports, it appears that centrifugal forces are not a factor in the production of acute symptoms of aerodontalgia.

The majority of reports of aerodontalgia are from decompression chambers in which temperature and motion play no part. The aerodontalgia reports from actual flight appear to coincide in symptomatology and etiology with those from decompression chambers. Thus, exposure to low barometric pressure appears to be the activating factor in toothaches at high altitude. However, the exact mechanism is complicated by the many aspects of low barometric pressure—anoxia, expansion of free gases, bends and other somewhat obscure phenomena.

It has been suggested that aerodontalgia may be caused by the expansion of air trapped under fillings. Numerous investigators[13, 14] have experimentally produced air bubbles under dental restorations and exposed these patients to low barometric pressure (Fig. 2). No symptoms were experienced in these cases. Consideration of the physics of this problem reveals that one of two conditions exists—either the entrapped air is in communication with the atmosphere, or it is completely trapped by the nonexpendable walls of the tooth and the filling material. If the entrapped air is in communication with the atmosphere, the pressure would be quickly equalized and any pain incurred would rapidly subside while altitude is maintained. We know that this does not occur. If the air bubble is not in communication with the environment, there could not be any volume or pressure change in view of the fact that barometric pressure changes are incommunicable through inelastic walls. We must conclude that air under fillings is not the cause of dental pain while flying.

Activating Factors.—We believe that the prerequisite for toothache at altitude is a pathologic disturbance of the pulp, except for those cases attributable to aerosinusitis. Moreover, many types of pre-existing lesions are apparent, from mild irritations of the pulp to necrotic pulps with periapical involvement. Some forms of pathologic disturbance are reversible; in others irreparable damage has occurred. Since various degrees of pre-existing lesions have been reported and in view of the different types of cases, it seems likely that there may be more than one explanation for the exacerbations at altitude.

A valid explanation for pain in teeth with putrescent pulps explains a few but not the great majority of case histories

11. Lipson, H. J., and Weiss, S. G.: Biologic Approach to Problems in Aviation Dentistry. J.A.D.A. 29:1660, September 1, 1942.

12. Sognnaes, R. F.: Studies on Aviation Dentistry. Ottawa, Canada: National Research Council, 1944.

13. Harvey, Warren: Some Aspects of Dentistry in Relation to Aviation. Proc. Roy. Soc. Med. 37:465, June 1944.

14. Weiner, L., and Horn, E. C.: Etiology of Aerodontalgia. Air Surgeon's Bul. 2:156, May 1945.

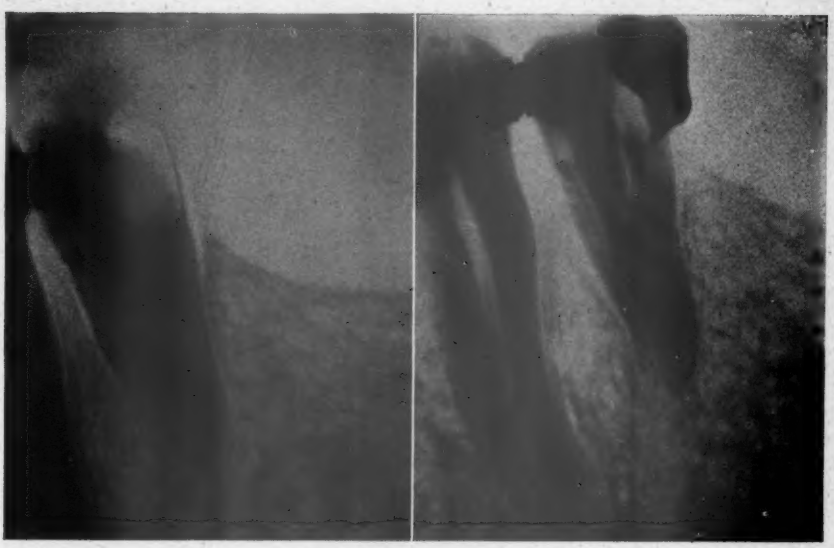

Fig. 2.—Left: Caries-free cavity. Right: Same cavity capped to enclose an air space. No symptoms occurred during exposure to decompression.

of aerodontalgia. The expansion of gases occurring during ascent in putrescent pulps and abscess cavities may be an activating factor in some cases. Instances have been reported in which cellulitis followed aerodontalgia. Frequently, patients report to the clinic suffering from toothache a few hours or days after having completed a simulated flight in the altitude chamber without incident.[15] This complaint is consistent with the observation that similar reactions occur after travelers cross mountainous country by land conveyance. Necrosis of the contents of the pulp chamber and root canal has been found in many cases. As a working hypothesis, it is suggested that gases, generated as a by-product from necrotic pulp tissues and expanding under reduced barometric pressure, may expel septic material through the apical foramen into the surrounding tissues, resulting in an exacerbation of a chronic condition.

Experiments[16] performed at the German Research Station of Aviation proved that it is possible for expanding gas in the root canal to expel material through the apical foramen. Subjects with very apparent periapical lesions were selected, root canal therapy was instituted and the canals, when they were clean, were filled with thorotrast, a viscid x-ray contrast medium. An air space was left in the canal and the cavity was filled with more thorotrast, cement and finally an adhesive wax to insure airtight closure. The subjects were taken to 38,000 feet in the decompression chamber with stops at various altitudes where roentgenograms were taken. The roentgenograms showed an increase in the volume of the air bubble and the thorotrast gradually expelled

15. Kennon, R. H., and Osborn, C. M.: Causes and Treatment of Aerodontalgia. Air Surgeon's Bul. 2:442, December 1945.

16. Freitag, W.: Die Veranderungen des Luftdruckes und ihr Einfluss auf das Zahnsystem des Menschen. Luftfahrtmedizin 9:49, 1944.

Fig. 3.—Left: Roentgenogram taken at ground level showing the root canals of the left central incisor and the left cuspid filled with thorotrast with an entrapped air space in the pulp chamber. Right: Roentgenogram taken at 38,000 feet in the decompression chamber under extremely difficult circumstances. The thorotrast has been expelled through the apex into the surrounding tissues owing to the expansion of the air space. (See Freitag.[16])

through the apex, penetrating into the surrounding tissues (Fig. 3). In some subjects, one-third of the thorotrast remained in the root canal; in others, the canal was completely evacuated. One subject had a fistula into the oral cavity, and at 27,000 feet the greater part of the thorotrast had been evacuated through the fistula into the mouth.

It should be pointed out that this is only possible under certain conditions: (1) there must be a permeable apical foramen; (2) the contents of the canal must be of viscid or fluid consistency; (3) a small quantity of gas must be present. Pain by this mechanism can occur only if all three conditions are present. Each of these conditions is seen fairly often, and there is justification for assuming their concurrent occurrence in some cases. Supporting this contention, all periapical lesions disclosed by roentgenograms are not painful at altitude. An x-ray study[17] of 500 fighter pilots, who were supposed to be in excellent dental condition, revealed forty-eight periapical lesions, but only eight elicited pain during flight.

In multirooted teeth with tissue necrosis in one canal, some pulp tissue may remain vital. The expansion of gases from the necrotic contents may irritate the remaining vital tissue and cause pain at altitude.

In the teeth without periapical involvement but with pulp abscesses, the expansion of gas in the abscess cavity can cause pain at altitude. Histologic sections of teeth which ached severely at very low altitudes and which were extracted immediately after the flight substantiate this belief (Fig. 4).

In a consideration of the expansion of gases as an activating factor in aerodontalgia, the possibility must not be overlooked that the expansion of gas in pulp chambers, expelling septic material through the apex, may also be a factor in the actual development of the apical lesions and may disseminate focal infection in airmen.

17. Goldhush, A. A.: A Dental Survey of Fighter Pilots. Air Surgeon's Bul. 2:436, December 1945.

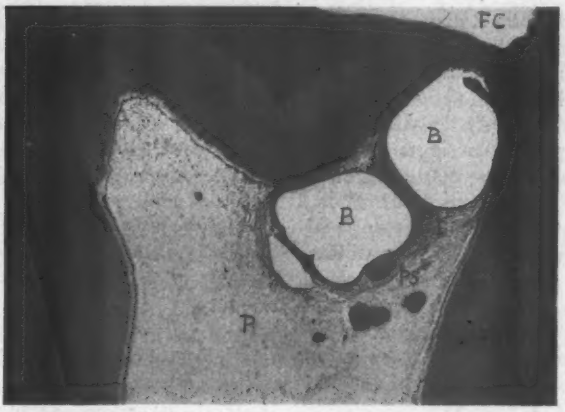

Fig. 4.—General view of tooth in which intolerable pain was experienced at 5,000 feet, showing large bubbles (*B*) in pulp horn surrounded by area of acute inflammatory reaction (*I*); *PS*, pulp stones; *P*, pulp; *FC*, floor of cavity. (See Orban and Ritchey.[7])

The majority of teeth which have been painful at altitude showed no apical disease on roentgenographic examination, and histologic sections of many reveal no chronic inflammation or abscess formation. A few teeth which ached during decompression were extracted and fixed at altitude.[18] The histopathologic sections of these teeth showed inflammatory changes and peculiar foam-like spaces in the pulp. These spaces may have been filled with gas or with a fluid; even if gas-filled, the gas might not necessarily have been nitrogen. Other teeth which caused trouble at altitude were extracted within one hour of return to ground level; these specimens showed either edema with cellular infiltration or edema alone. It should be added that recent animal experiments suggest that anoxia may be a contributing factor in toothache at altitude.[19]

Since we believe that some pulp lesions existed prior to the onset of aerodontalgia and that exposure to altitude caused an exacerbation of these pre-existing lesions, conditions which predispose patients to pulp changes should be discussed. It has been demonstrated that heat production during cavity preparation and the use of unproven drugs cause some pulp irritation. Silicate cement fillings and other cements produce pulp reactions which persist long after the insertion of the material. It is even possible to conceive of chemical irritation resulting in edema caused by amalgam fillings in close proximity to the pulp. These changes in the pulp appear to embarrass the circulation of the pulp. The impact of whatever happens at altitude further disturbs the pulp and results in pain.

Treatment.—Procedures for diagnosis and treatment of aerodontalgia differ but little from the methods of diagnosis and treatment of toothache occurring on the ground. However, high altitude toothaches are infinitely more difficult to diagnose because the patient had the pain at altitude and usually presents no symp-

18. Ritchey, B. T., and Orban, Balint: Toothache at Altitude (to be published).

19. Orban, Balint; Ritchey, B. T., and Zander, H. A.: Experimental Study of Pulp Changes Produced in the Decompression Chamber (to be published).

toms on the ground. Reliance upon sedative treatment such as zinc oxide and eugenol is questionable in some cases; on the other hand, wholesale extraction is not indicated. Many investigators believe that a percentage of teeth which ache at altitude survive. Until histologic sections were made of teeth which had caused pain at altitude, it was not realized that so many serious pulp conditions exist without symptoms at ground level. Aerodontalgia has pointed out the difficulties and inadequacies of present-day methods of pulp diagnosis.

Periodontal Aspects

There is a widespread legend among flyers that high altitude and the use of oxygen have a deleterious effect on teeth, fillings, gums and the mouth in general. As concerns periodontal aspects, the literature reveals little to verify or repudiate these beliefs, but various sources have reported a relatively high incidence of gingival disturbances among flying personnel. Many clinicians have noted the persistent nature of these disturbances among flyers and find them resistant to treatment. In addition to the usual etiologic factors of dental origin, the disorders have been attributed to factors peculiar to flying conditions and flying personnel. Flying fatigue, nervous tension, use of oxygen, reduced atmospheric pressure, lack of oral hygiene and other conditions peculiar to the existence of flyers have been suggested as factors predisposing flying personnel to a high incidence of gingival disturbances.

Incidence.—Replies[20] to a questionnaire sent to 200 army air bases indicated that gingival disturbances are more prevalent in air crews than in ground personnel; in returnee combat and ferry pilots than in less experienced flyers; and in transient than in permanently based personnel. Similar reports have been received from the air forces of other nations.[21, 22] Although the majority of reports indicate that flying personnel have a greater incidence of periodontal disturbances than non-flying personnel, we lack comparative statistical data of a positive nature.

However, by considering other factors, these reports assume new proportions. These pilots are a select group, physically and mentally—they are the cream of the nation's youth. During their service in the army, they have undoubtedly received better-than-average dental attention. In one report the oral hygiene of 1,000 fighter pilots, evaluated by examination and interview, was average or above average in 93 per cent of the cases. Considered in this light, the incidence of gingival disturbances in this select group is high.

Etiology.—Although the etiologic factors commonly associated with periodontal disease, namely, calculus, occlusal trauma, faulty restorations, habits, etc., probably play the major role as causative agents in airmen, the relatively high prevalence of gingival disturbances justifies the search for other factors. It is apparent that etiologic factors peculiar to flying and to the living conditions which result from military aviation operations play at least a secondary role and are largely responsible for the persistent or chronic nature of many gingival disturbances among airmen. Failure to take these intangible factors into account frequently results in unsuccessful treatment.

All stages of periodontal disease from the incipient to the advanced state were evident among the pilots studied. In one

20. Medical Safety Division, Office of Flying Safety, Headquarters, Army Air Forces: Flying and Dentistry. Air Surgeon's Bul. 1:1, December 1944.

21. Stamm, W. P.; Macrae, T. F., and Yudkin, S.: Incidence of Bleeding Gums Among R.A.F. Personnel and the Value of Ascorbic Acid in Treatment. Brit. M. J. 2:239, August 1941.

22. Bronstein, Y. E.: Effect of Hypoxemia on Secondary C-Hypovitaminosis. Am. Rev. Soviet Med. 1:314, April 1944.

group, 12 per cent of the pilots with periodontal disturbances exhibited a pathologic degree of tooth mobility. Dietary factors were evident in the cases of a few pilots who had returned from harrowing experiences overseas. Vincent's infection was a common finding. In a study of 106 flyers who continued to fly after noticing this condition, seventy-two said that the condition became worse and eleven complained of hemorrhage while flying.

This mention of hemorrhage brings up a point worthy of speculation. A recent report[23] of the Office of Scientific Research and Development showed that the vitamin C or ascorbic acid metabolism was disrupted by mild anoxia produced by exposure to high altitude. Increased capillary fragility occurred in one subject when the ascorbic acid plasma level was sufficiently reduced. The authors recommended that liberal quantities of fruit and fruit juices be supplied in the diet of aviators. This scurvy-producing effect of mild degrees of anoxia may play a part in periodontal disturbances in airmen.

Along these same lines, a Russian investigator[22] has reported periodontal disturbances—"retraction and hyperplasia of the gums, alveolar resorption and gingival hemorrhage"—experimentally produced by exposing normal guinea pigs on a normal diet to high altitudes without supplying additional oxygen. If this finding can be confirmed, it will be an important development in the study of periodontia as well as in aviation dentistry.

A rather common complaint, especially of long range fighter pilots, is that the breathing of oxygen at altitude induces a dry mouth. If this dryness does exist, it may be due to apprehension, lack of adequate water intake before and during flights or a combination of other abstract factors. However, there remains the possibility that the breathing of oxygen is a primary cause of dryness of the mouth. Prolonged periods of dryness might conceivably result in an increased incidence of dental disease. In addition to its relation to caries incidence, it has been suggested that, because of the absence of the necessary moistening, disturbances of the mucous membranes of the mouth and nasopharynx develop. Experiments[24] were performed at the School of Aviation Medicine to determine if there are any demonstrable changes in volume, pH and Lactobacillus acidophilus counts of the saliva of persons exposed to decompression and oxygen for relatively long periods of time. From the results, it appears that oxygen and altitude per se have no effect on the saliva as studied in this project.

Circumstances incident to the everyday life of flying personnel cannot be overemphasized as probable etiologic factors in periodontal disease. Air crews, especially bomber and transport crews, lead unbalanced existences owing to the transitory nature of their jobs. Irregular meals, unbalanced and inadequate diet, neglect of hygiene when traveling from one station to another, lack of proper rest and excessive smoking and drinking stemming from the stress of aerial warfare contribute to a generalized lowering of tissue resistance. Long bomber or transport missions and brief but strenuous fighter missions, day after day, are extremely fatiguing. Nervous tension involved in combat maneuvers, formation flying and gunnery is an added impact after physical strain has exhausted a large part of the available energy. Even

23. Ivy, A. C., et al.: Effect on Human Subjects of the Degree of Ascorbic Acid Deficiency Induced and of the Disturbances of the Metabolism of the Vitamin by Mild Anoxia and Its Correlation with Acid-Base Disturbances and 17-Ketosteroid Excretion. C. A. M. Report No. 457. Washington: National Research Council, 1945.

24. Mitchell, D. F.: Effects of Oxygen and Decompression on Saliva. Project No. 392, Report No. 1, AAF School of Aviation Medicine, Randolph Field, Texas, 1945.

the most experienced flyers are under tension, for flying requires continuous alertness. Nervous tension interferes with digestion and assimilation of essential foods. Flying fatigue is recognized as an entity by the flight surgeon and is reason for temporary grounding.

Habits

A psychosomatic factor, related to nervous tension and plane maneuvers, which consistently remains unrecognized and uncontrolled, is the habit of clamping or grinding of the teeth, often referred to as bruxism or bruxomania.[25] The significance of dental pressure habits as etiologic factors in periodontal disease in flying personnel cannot be overemphasized. Leof[26] pointed out that the majority of periodontal cases in everyday practice have some pressure habits as a cause or as a contributing factor. During a dental survey of fighter pilots, 45 per cent of the pilots volunteered information concerning their diurnal, nocturnal and flight habits. Of one group of 146 pilots with periodontal disturbances, seventy-seven admitted practicing pressure habits. It was not recognized until the survey was completed that the use of the word "habit" confused many pilots. Not all pilots interpreted clamping, during voluntary self-protective maneuvers used to increase tolerance to positive acceleration, as a habit. Moreover, pilots are prone to deny or belittle this factor. The actual incidence of habits in fighter pilots is probably greater than was originally recorded in the survey.

Many pilots admitted that these habits were the result of tension they were under, not only in combat, formation flying or maneuvers, but at all times in the air. A few mentioned that their habits started during combat duty. A report[27] from the Royal Canadian Air Force pointed out that clenching the jaws is a common complication of the Valsalva procedure (pinching the nostrils, closing the mouth and attempting to blow) when equalizing pressure in the middle ear. Pressure habits are more common in fighter pilots than in bomber pilots and more prevalent among pilots than among their crews.

Such habits are as multiple and varied as there are individuals. Habits involving the teeth and other tissues, such as cheek biting and sucking on interproximal spaces, are common offenders. Pilots can inflict severe trauma on their oral tissues during flight and be completely unaware of the damage or pain until landing. Chapped lips, cuspal and incisal indentations, scars on the buccal mucosa and papillomas resulting from constant chewing of the cheeks have been reported. The habits which are most common in flight and result in the greatest damage are clamping and grinding habits. They may be practiced throughout all flights, in maneuvers only, and both in flight and on the ground. Pilots who practice these habits are aware of a throbbing soreness or, on landing, develop a consciousness of the teeth, which quickly disappears. Tired jaw muscles are a common subjective sign. The prolonged tension and compression resulting from clamping and grinding cause congestion and irritation of the periodontal tissues, as differentiated from the stimulating effect of the intermittent forces of normal function. These habits can in time damage the periodontal membrane, causing periodontal disease, or they may become a secondary factor in an already existing periodontal disturbance.

25. Goldhush, A. A.: Oral Aspects of Aviation Medicine, in Burket, L. W.: Oral Medicine. Philadelphia: J. B. Lippincott Company, 1946.

26. Leof, Milton: Clamping and Grinding Habits; Their Relation to Periodontal Disease. J.A.D.A. 31:184, February 1, 1944.

27. Stewart, C. B.; Warwick, O. H., and Bateman, G. L.: Acute Otitic Barotrauma Resulting from Low Pressure Chamber Tests. J. Aviation Med. 16:385, December 1945.

Many persistent cases present missing teeth, tilted teeth, deep overbites and other forms of traumatic occlusion. Functional occlusion has been lost. Simultaneously there develops hyperfunction of certain or all remaining teeth. With the accompanying pressure of clamping or grinding, this increases manyfold. Having decided that hyperocclusal stress is an important etiologic factor in these periodontal disturbances, the dentist must reduce this not only by occlusal equilibration but also by habit control.

. *Loss of Fillings*

Another legend in air force circles is that fillings fall out at altitude and, on a few occasions, this has been confirmed.[25] It is reasonable to assume that the biting force, which is limited, not by muscle power alone but primarily by the threshold of pain of the tooth-supporting tissues, can be greater in flight than the biting force normally applied on the ground. The excessive biting force in flight is often associated with clamping or grinding habits, nervous tension or muscle tension when counteracting the effects of maneuvers. Whereas the normal or even the maximum biting force on the ground will have no effect on a defective filling or a filling with inadequate retention, the excessive biting force in flight is likely to dislodge it.

Relation of Dental Factors to Aero-Otitis

The effect of flight on the ear is the most frequent cause of discomfort among flying personnel. Changes in atmospheric pressure are a source of constant trauma to the ear. Aero-otitis media is an acute or chronic traumatic inflammation of the middle ear caused by a pressure difference between the air in the tympanic cavity and that of the surrounding atmosphere. It is characterized by pain or discomfort in the ear, with varying degrees of inflammation of the drum membrane observed through the otoscope. In most cases, it is a "transient" problem, but a very small percentage of persons are subject to recurrent attacks of aero-otitis over an appreciable period of time. Here again, as occurred some years ago in another phase of otolaryngology—hearing—dental investigators[28, 29] sought to explain some cases of aero-otitis on the basis of malposition of the mandible, malocclusion or the loss of vertical dimension.

The fundamental cause of aero-otitis is a failure of ventilation of the middle ear. Normally there is no difficulty in relieving ear block by swallowing or yawning, procedures which result in opening the pharyngeal orifice of the eustachian tube by muscle action. If relief is not obtained this way, then air can be forced into the ear by the Valsalva maneuver. The incidence of aero-otitis has been reported to be from 1 to 18 per cent among army air force personnel exposed to decompression. The Navy[30] reports that approximately 25 per cent of submarine personnel entering the compression chamber suffer aero-otitis, judged objectively by otoscopic examination. The incidence appears to vary with climate and the presence of nasopharyngitis, but not in a sufficient degree to predict an increased incidence due to these factors alone.

In light of our present knowledge, it must be admitted that no conclusive explanation has been forwarded on the relation of temporomandibular dysfunction to middle ear disturbances. Moreover, the problem of mandibular malpo-

28. Willhelmy, G. E.: Relationship of Overclosure of Mandible to Ear Pains While Flying. D. Digest 47:544, December 1941.

29. Lowry, R. A.: Loss of Intermaxillary Distance: Effect on Aviators and Relief by Interdental Splint. U. S. Nav. M. Bul. 37:367, July 1939.

30. Kelly, W. J.: Dental Research Activities at the U. S. Submarine Base, New London, Conn. Proceedings of the Second Conference on Aviation Dentistry, AAF School of Aviation Medicine, Randolph Field, Texas, 1946.

sition as related to aero-otitis has been highly overemphasized. A recent report[27] indicated that the incidence of permanent partial eustachian blockage of serious degree was of diminutive proportion. Temporary earblocks must be accepted as an everyday effect of flying; however, this difficulty is easily overcome in the great majority of cases. Failure to open the eustachian tube occurs most among trainees and passengers, owing to inexperience or carelessness. After instructions in methods of ventilating the ear have been given and experience in these procedures has been acquired, the incidence of ear symptoms is markedly reduced.

The pitfall of many past investigators of this problem has probably been in their selection of cases of aero-otitis for dental treatment. This can best be emphasized by a report[13] from the Royal Air Force. In decompression tests of 1,000 men, eighty-nine were found who developed symptoms in their ears. When decompressed three times, there were only seven of the eighty-nine who had pain on each occasion. Of the seven there were only three whose otolaryngologic history offered no contributory factor; in only one of these men malocclusion or mandibular malposition may have been a factor. Most dental papers have failed to take this difficulty in selection into account, nor do they contain adequate otolaryngologic histories.

Dental investigators of aero-otitis have been treating cases by "opening the bite" or "repositioning the mandible" by the use of splints or appliances. A deviation from these procedures has been made by Kelly,[31] confronted with middle ear disturbances in submarine personnel. He was concerned with the functioning occlusion rather than static occlusion. By spot-grinding inclined planes at what he terms "points of premature contact," the vertical dimension in static occlusion was not altered. This grinding merely freed the mandible in its excursions. The degree of success reported in aero-otitis cases is questioned because selection was not up to the standards just described.

To summarize the relation of dentistry to aero-otitis, we find the same state of confusion as in the relation of dental factors to hearing and other middle ear disturbances. A comprehensive critical review of temporomandibular joint dysfunction is necessary to evaluate the past work and to plan further studies. The effects of ascent and descent offer a new method of experimentation in the field of temporomandibular dysfunction as related to middle ear disturbances.

Summary

It has frequently been remarked that "good dentistry" will eliminate the dental problems at altitude. It should now be apparent that dentistry has not been "good" enough to solve these problems to date. The gaps in our knowledge are too great. When the questions that have arisen during the investigation of the effects of altitude on the dental tissues have been answered, a substantial addition will have been made to our knowledge of dental physiology and disease. Dentistry will be on a more rational basis. Aviation dentistry will not only be a part of clinical practice, but research in its many phases will affect everyday dental procedures.

31. Kelly, W. J.: Results of Dental Therapy in Fifty Cases of Aerotitis Media in Submarine Personnel Based upon a New Functional Concept of Eustachian Tube Blockage. Interval Report No. 1, Research Project X-434 (Sub. No. 90), Medical Research Department, U. S. Submarine Base, New London, Conn., 1946.

MOUTH CANCER AND THE DENTIST

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The symptoms of early mouth cancer are seldom distressing or markedly painful. When a malignant tumor appears in the gum, the hard palate, the edge of the tongue or the cheek, the mild character of the symptoms and the location of the lesion logically suggest to the layman that there may be some trouble with the teeth. In such cases, therefore, it is natural for the patient to consult his dentist first. Histories of patients with mouth cancer who have applied to the Memorial Hospital show that in a high percentage of cases the advice of the family dentist had been sought first before a physician was consulted.

The percentage of patients having various forms of mouth cancer who consult a dentist before consulting a physician is shown in Table 1. It is particularly noteworthy that in cancer of the gum the opinion of a dentist was sought first in approximately 60 per cent of the cases. Many of these patients are greatly indebted to their dentists for the immediate recognition of the probably serious nature of their complaints, and for sound advice as to the need for further medical opinion and diagnosis.

On the other hand, in the cases of many patients with mouth cancer who first consult a dentist, it is obvious that the malignant character of the disease is not recognized (Table 2). Under such circumstances some form of dental treatment is usually given over a considerable period of time, but in any case the noncommittal attitude of the dentist tends to reassure the patient that the complaint is not serious. Should the dentist, when first consulted, miss the opportunity to diagnose early mouth cancer, his oversight may bring about an irreparable loss of time in beginning proper treatment and the eventual result may be death with hopelessly advanced cancer rather than prompt cure of an early growth.

Such errors and missed diagnoses of early mouth cancer may be ascribed at least in part to the dentist's reluctance to venture beyond what he considers strictly the actual field of dentistry. To the ethical dentist it might even seem presumptuous to offer any suggestion or advice with so serious a connotation as cancer. Although not circumscribed by such a limited concept of his responsibilities, nevertheless the average dentist has probably received scant instruction in dental school concerning the symptoms of mouth cancer and the importance of early diagnosis. Much of what he knows of the subject has been learned, in all likelihood, by bitter experience when an occasional patient in his own practice, at first treated for dental symptoms, proved ultimately to have been suffering from mouth cancer all along. In such tragic instances of delayed diagnosis, the dentist must regret deeply that he did not recognize the malignant character of the lesion earlier

Table 1.—Percentage of Patients with Mouth Cancer Who Consult a Dentist Before Consulting a Physician

Primary Site of Cancer	Per Cent of Patients Consulting a Dentist Before a Physician*
Gum	59
Hard palate	35
Buccal (cheek) mucosa	22
Anterior two-thirds of the tongue	21
Floor of mouth	20

*One hundred cases were reviewed for each primary site.

*Attending surgeon, Memorial Hospital.

Table 2.—Delay in Diagnosis of Mouth Cancer in Patients Who Consulted a Dentist Before Consulting a Physician

Primary Site of Cancer	Number of Cases Reviewed	Probability of Cancer Recognized by Dentist		Probability of Cancer Not Recognized by Dentist	
		Number of Cases	Average Time Between First Seeing a Dentist and First Seeing a Physician	Number of Cases	Average Time Between First Seeing a Dentist and First Seeing a Physician
Gum	59	18 (31%)	4 weeks	41 (69%)	5 months
Hard palate	35	14 (40%)	3 weeks	21 (60%)	13 months
Buccal (cheek) mucosa	22	11 (50%)	5 weeks	11 (50%)	12 months
Anterior two-thirds of the tongue	21	8 (38%)	5 weeks	13 (62%)	7 months
Floor of mouth	20	9 (45%)	2 weeks	11 (55%)	5 months
Total	157	60 (38%)	.....	97 (62%)	.....
Approximate average time	.....	.....	3½ weeks	.....	8 months

in its course, when the chance of cure certainly would have been greater. In the final analysis, the blame lies not so much with the individual dentist as with those responsible for the undergraduate and postgraduate dental education and training. Had the subject of cancer been given greater emphasis in dental schools and in dental society meetings, many of these tragedies due to missed diagnoses of early mouth cancer might have been avoided.

The importance of cancer education not only for dentists but also for the medical profession in general and for the laity has long been acknowledged. Considerable contributions to this end have been made by cancer clinics and individual physicians. In addition, the American Cancer Society (founded in 1913 as the American Society for the Control of Cancer) has furnished much information to the laity. In recent years, however, these diversified efforts have been welded and intensified so that cancer education is at present being widely publicized. As part of this campaign for organization and propagation of cancer facts, this paper is being presented.

The specific purpose of this paper is to discuss the dentist's obligation and responsibilities in the diagnosis of mouth cancer, to describe briefly the symptoms and diagnosis of malignant tumors of the mouth and to outline the procedure to be followed in cases of suspected cancer.

Symptoms of Mouth Cancer

Early cancer of the oral mucous membranes is characterized by the appearance of a small indurated placque or ulcer, which infiltrates the tissues in which it arises. When the growth occurs on a fixed or relatively immobile part, such as the gum or hard palate (Figs. 1-3), pain and tenderness may be absent for a period of weeks, sometimes months, after the discovery of the lesion by the patient himself. In other more movable structures of the mouth, especially in those containing more sensory organs, such as the anterior portions of the tongue, the floor of the mouth or the cheek (Figs. 4-7), pain may be an early or even the first symptom. In any case pain in mouth cancer does not occur until secondary infection of an ulcerated growth has taken place. Most other

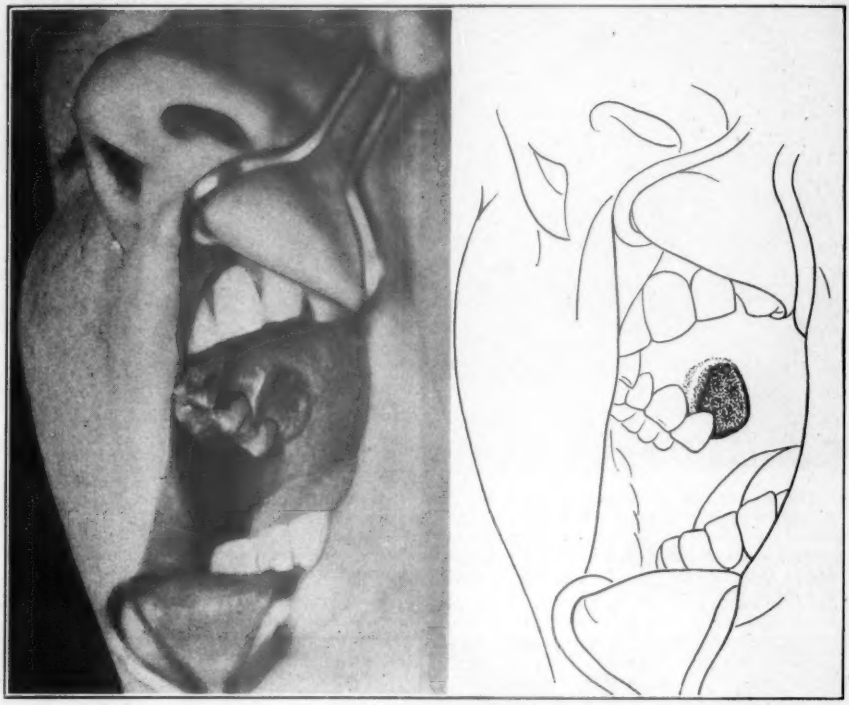

Fig. 1.—Cancer of the gum diagnosed clinically by a dentist. One week before admission the patient developed a "soreness" of the gum and, thinking it due to his teeth, consulted his dentist, who immediately made a clinical diagnosis of cancer.

ulcerated lesions of the mouth cavity (herpes, Vincent's infection, tuberculosis, trauma, etc.) are more painful in the early stages.

The usual cancerous ulcer of the mouth is coarsely granular and shows less evidence of infection and local inflammation than do the benign lesions. In mouth cancer, the surrounding mucous membranes commonly exhibit signs of long-standing chronic irritation, in the form of atrophy, chronic glossitis, leukoplakia, etc. Malignant tumors of soft parts are almost always more indurated than the tissues in which they arise, and the extent of a growth can be fairly well determined by the palpable extent of the induration. Cancerous lesions, when large, are usually fissured and sometimes necrotic (Figs. 6, 8). In some cases, a growth may be ulcerated widely on the surface but nevertheless may extend for a considerable distance beneath a surrounding zone of elevated but intact mucous membrane. A cancerous tumor of the antrum may perforate the upper alveolar process and gum, or the hard palate, to produce a fluctuant swelling.

As mouth cancer progresses, ulceration and deep infiltration become more apparent, accompanied by secondary infection, and only at this stage do pain and disability become marked. The later stages are characterized by progressively deeper infiltration of the tongue, the cheeks and the floor of the mouth, and by erosion of the mandible, the maxilla or the palate. As the normal structures

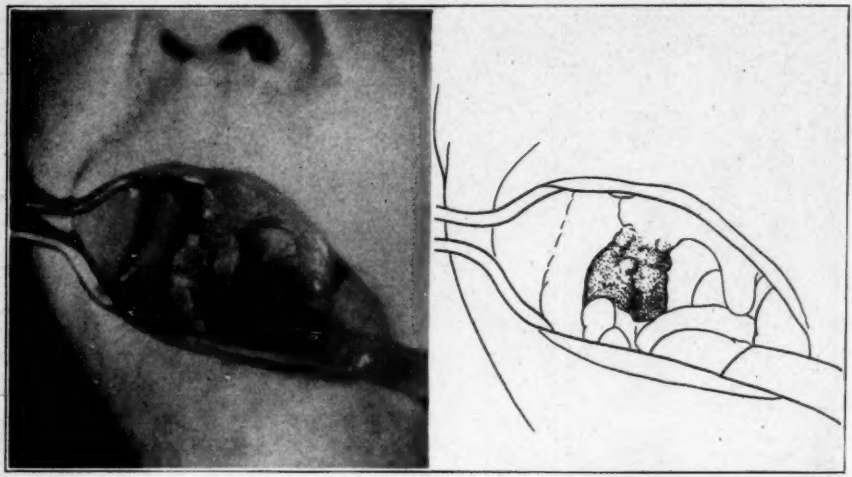

Fig. 2.—A case of cancer of the lower gum in which the diagnosis was delayed for three months while the patient was being observed and treated at a dental clinic. The patient first noticed a "sore" on his lower gum which interfered with the fit of his dental plate. He made several visits to the dental clinic of a hospital where he was told only to use a mouth wash. About two months later he applied to another hospital where a clinical diagnosis of cancer was made immediately.

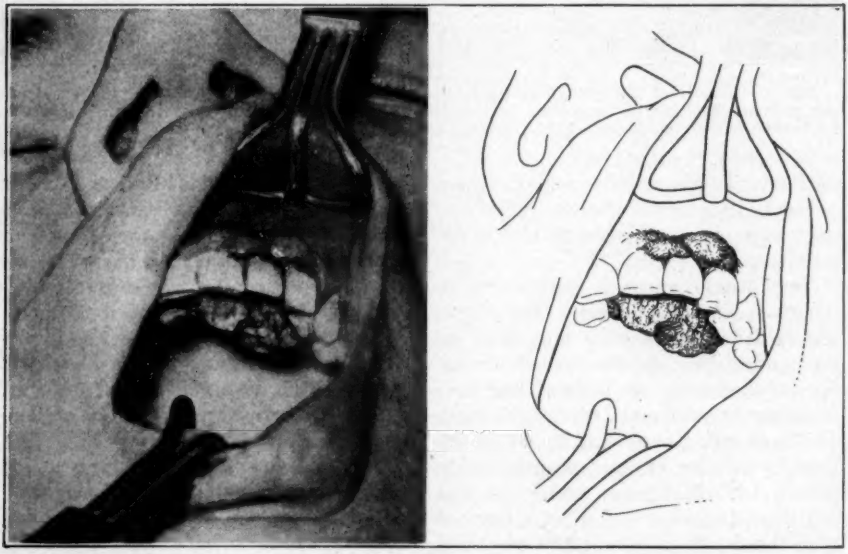

Fig. 3.—Cancer of the gum and hard palate undiagnosed for two months while the lesion was under the observation of a dentist and a physician. Two months before admission the patient noticed an ulcer on his gum and consulted his dentist, who prescribed a mouth wash. About a month later he went to his physician whose attitude was noncommittal. He finally consulted a second physician, who made a clinical diagnosis of cancer.

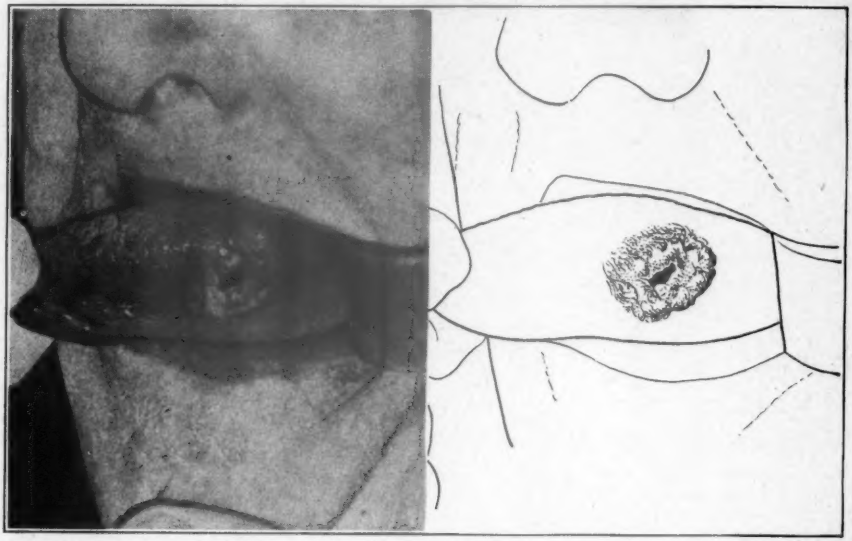

Fig. 4.—A case of cancer of the tongue in which advice was first sought from a dentist, who missed the diagnosis. Nine months before admission the patient noted a "sore" on his tongue. He consulted his dentist who spent considerable time adjusting his upper and lower plates in an attempt to relieve the "soreness." Six months passed before the patient finally consulted a physician, who made a clinical diagnosis of cancer.

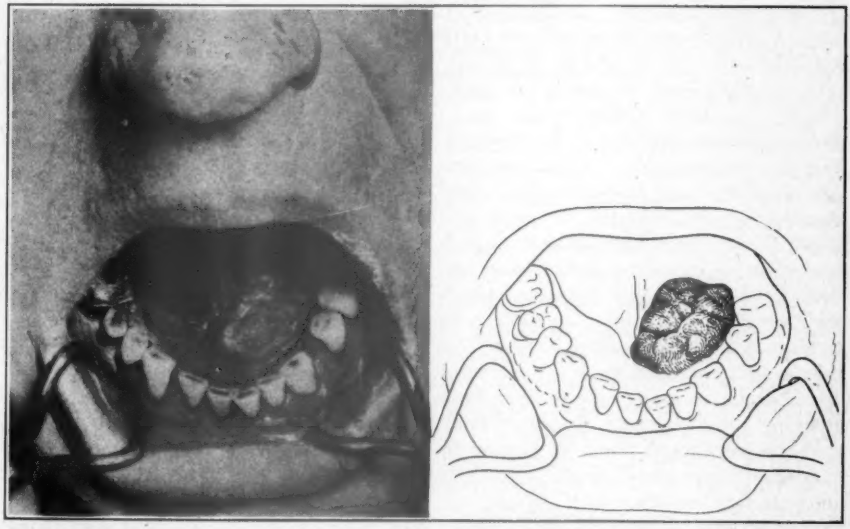

Fig. 5.—A case of cancer of the floor of the mouth first diagnosed by a dentist. Six weeks before admission the patient developed a "soreness" and pain in the floor of his mouth. He consulted his dentist, who, suspecting the serious nature of the lesion, immediately referred him to a hospital where biopsy showed cancer.

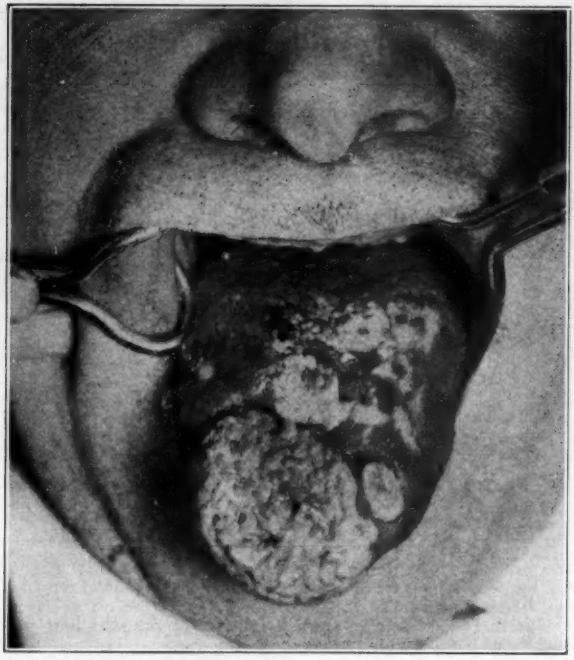

Fig. 6.—Leukoplakia and cancer of the tongue treated by a dentist by extraction of all teeth. Over three months passed before the patient was referred to a physician. Dental defects were in no way responsible for this lesion and extraction of teeth could not possibly be of benefit. The diagnosis and proper treatment of cancer were delayed for more than three months.

are invaded and eroded by the growth, the movements of the tongue and jaws are restricted and speech becomes less distinct. The swallowing of food and drink is often both difficult and painful, and in some cases the patient may not even be able to swallow his saliva, which must then be spat out (salivation). In other cases the expanding growth and edema may encroach upon the lumen of the pharynx or larynx so as to cause both dysphagia and dyspnea. Repeated hemorrhages may result from the erosion by cancer of large blood vessels. Death in uncontrolled mouth cancer usually occurs from one or more of the following complications: sepsis, malnutrition, dehydration, pain, hémorrhage, respiratory obstruction and metastasis.

The cervical lymph nodes may be involved by metastasis early in the course of the mouth cancer, while the primary lesion is only a few millimeters in diameter, but such invasion almost invariably takes place in the later advanced stages. At first there is a barely discernible enlargement of one or more lymph nodes, but as the disease progresses the metastatic cervical masses, sometimes bilateral, may reach a size of 10 to 15 cm. in diameter. Such cancerous lymph nodes frequently become infected, producing bulky, fluctuating, liquefied abscesses. If the malignant growth in the mouth and in the neck is not controlled, and if the patient survives long enough, metastasis almost invariably occurs to some viscus below the clavicle, such as the lungs or

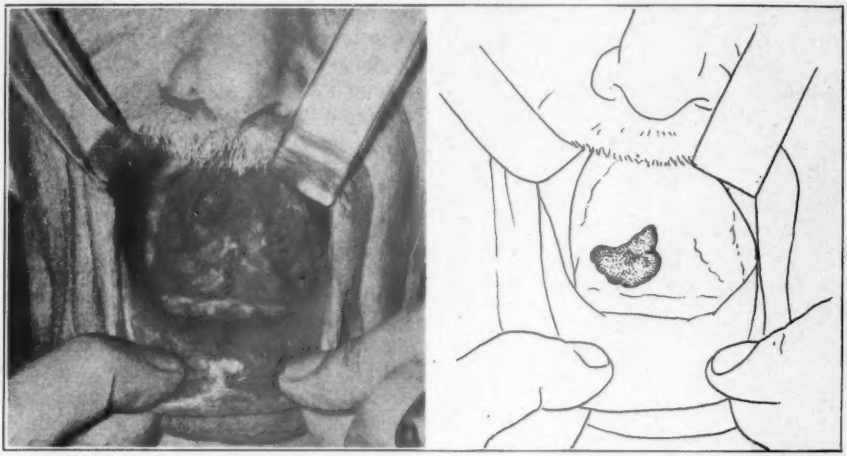

Fig. 7.—Cancer of the floor of the mouth in a dentist; undiagnosed for nine months while under his own observation. The patient had worn the same set of dentures for ten years. About nine months before admission he noted a "soreness" in the floor of his mouth. Believing his symptoms due to the bad fit of his lower dental plate, he spent nine months grinding off and attempting to adjust the denture. Finally the growth became so large that he felt constrained to consult a physician. A clinical diagnosis of cancer was made immediately and confirmed by biopsy.

the liver, or to the bones. It is only during the early and moderately advanced stages, when growths in the mouth and neck are relatively small and localized, that cures can be achieved.

Early Diagnosis of Mouth Cancer

It can be stated without any hesitancy that oral cancer is more serious and more important to the patient than any other condition with which it might be confused. Therefore, in any suspicious lesion of the mouth, both physician and dentist should consider cancer first, and should rule out such a possibility before waiting "to see what happens" or proceeding with treatment on the basis of a benign diagnosis. If the possibility of a malignant growth is considered at the beginning, few harmful errors in diagnosis will be made.

One significant fact to establish in the history of a suspected mouth cancer is that the lesion is chronic and progressive. If the patient can recall that the abnormality has been present for several weeks or months and is steadily increasing in extent, this fact alone suggests a malignant tumor (Figs. 4, 7). Nevertheless, failure to establish a history of long duration of symptoms is of negative value only, for it is not uncommon that a patient suffering from a cancerous growth several centimeters in diameter will consult a physician or dentist, insisting that his symptoms appeared only a day or two previously. It is curious that many persons are so unobservant of purely objective symptoms.

Simple inflammatory lesions (herpes, Vincent's infection, traumatic ulcer, dental abscess) are characteristically of sudden onset, accompanied by acutely painful symptoms which usually increase rapidly, come to a climax within a few days and then heal. On the other hand, cancer begins insidiously, often without subjective symptoms, and progresses slowly over a period of several weeks or even months before the patient is forced,

Fig. 8.—Cancer of the cheek undiagnosed for four months while the lesion was under the observation of a dentist. The patient first noticed what he called a "scratch" on his cheek. After two weeks he consulted a dentist, who extracted two teeth and treated the lesion for three months by mouth washes. The growth finally became so painful that the patient consulted his physician, who referred him to the Memorial Hospital where a diagnosis of cancer was made.

by painful symptoms or disability, to seek medical advice. For these reasons, any disorder of the oral cavity, such as an ulcer, a growth or tumor of any tissue, a warty lesion, an apparent chronic abscess, a fissured or palpably thickened area of leukoplakia, an unusual fullness or swelling of any tissue, should be observed with suspicion, keeping in mind the possibility of cancer, especially if the development of the lesion has been insidious and chronic.

Delay in Diagnosis.—It is a time-honored custom for both the physician and the dentist to do nothing more than give expectant treatment to patients whose complaints are vague or ill-defined. Such a conservative policy works well in most situations by eliminating trivial and transitory disorders, leaving for serious consideration only those cases in which the vague symptoms persist or grow worse. On the other hand, this expectant and conservative attitude invariably fails in the diagnosis of early cancer, in which the time element is of utmost importance. Many more early diagnoses of mouth cancer could be made and lives saved if dentists and physicians never gave expectant treatment for oral complaints except after first eliminating the possibility of cancer (Figs. 4, 8).

A frequent cause for failure or delay in the early diagnosis of mouth cancer is a somewhat sentimental or escapist attitude on the part of the dentist and the physician. When confronted with symptoms or findings suggestive of a malignant growth, especially if the patient is an old friend, naturally the doctor dislikes considering the possibility of so serious a disease and seeks a simpler explanation. This attitude of wishful thinking is of no avail. Certainly no great harm is done to the patient if the diagnosis and treatment of such benign lesions as simple ulcer, Vincent's infection, gumma or even tuberculous ulcers are considered only tentative, while definite diagnostic procedures to rule out a malignant growth are being carried on.

The treatment of these benign chronic lesions does not constitute an emergency. On the other hand, the immediate diagnosis of cancer does constitute an emergency, for a small growth or lesion, capable of complete removal through a minor incision or by a limited application of radiation therapy, if neglected may greatly increase in extent within a few weeks (or even days) and may metastasize to the cervical lymph nodes, or disseminate widely throughout the body, and become incurable while the dentist

or physician is "waiting to see what happens" and making desultory efforts to prove a benign diagnosis.

If the dentist or physician whom the patient first consults for mild symptoms of early cancer does not immediately suspect the serious nature of the complaint, his reassuring attitude and conservative treatment imply that there is nothing much to worry about. Experience has shown that after such reassurance the symptoms will be tolerated for a long time and medical treatment will not be sought until there is marked disability or pain—symptoms of advanced cancer.

It is the first dentist or physician consulted who has the "golden opportunity." Reviews of clinical histories at the Memorial Hospital show that in cases of delayed diagnoses the average interval between the first and second visits to a physician or dentist is much longer than the interval between subsequent visits.

Accessibility of the Oral Cavity to Physical Examination

Cancer of the mouth is not difficult to diagnose as compared with cancer in many other locations. Fortunately, the whole oral cavity is accessible to clinical inspection and digital palpation so that any part of the mouth can be examined without special apparatus, and the diagnosis of any suspected lesion can be made by direct objective findings rather than by the indirect methods (roentgenography, endoscopy, etc.) which must be used in many other portions of the anatomy.

Observation by the Patient.—Much of the oral cavity, particularly the lips and the tongue, is under daily observation by the patient himself. The tactile sense of the anterior portion of the tongue is so acute that any irregularity of the mucous membrane surface of the palate, gums, cheeks or anterior tongue is not likely to remain unnoticed. The lips are under daily observation by all persons who use a mirror, so that no visible lesion in this region can escape notice. Most surface abnormalities of the lips and anterior portions of the mouth should therefore be immediately discovered by the tactile and visual senses. It is a curious fact that so many patients overlook, or at least disregard, perfectly obvious surface cancers so long as they are unaccompanied by pain or discomfort.

Among the laity, one prevalent misconception is that cancer must always be accompanied by pain from the beginning. The average layman believes that pain, or marked discomfort, is inevitable in any serious disease. This belief is supported by his own observations and by hearsay in those terminal cases of cancer which come to his attention, despite the fact that in such terminal cases the suffering is probably due mainly to the complications of secondary infection rather than to the growth itself. It is not recognized generally that cancer—deeply situated and uncomplicated by marked ulceration and infection—may cause death without pain at any time during its course. Patients who admit seeking medical advice long after a suspected growth has been noted frequently state that they realized something was wrong, but they did not think that the situation was serious because there was no pain.

Observation by the Dentist.—Members of the dental profession hold a position of unique advantage in regard to the early diagnosis of intra-oral cancer and in prophylaxis against this disease. Malignant tumors of the mouth occur commonly in persons who apparently enjoy perfect health. Many of them have seldom, if ever, needed to consult a physician, at least not for any complaint which would require a thorough examination of the oral cavity. The medical profession is powerless to assist this group of persons from the standpoint of early diagnosis and prophylaxis. On the other hand, it is now a generally accepted rule of personal hygiene, from childhood on,

to consult a dentist once or twice a year for a thorough examination of the teeth. This furnishes the dentist with an opportunity to scrutinize the oral cavity periodically under the most desirable conditions. On these periodic visits, the dentist might well inspect and palpate the tongue, the floor of the mouth, the gums, the palate and the cheeks, noting on his records any departure from the normal. Such a routine procedure would require but a minute or two, and undoubtedly would be highly appreciated by the patient. If there is any suspicion that cancer or an incipient cancer exists, the dentist should refer the patient to a physician or hospital for a medical opinion. If the dentist does not avail himself of this unusual opportunity for early recognition of cancer, the irreparable loss to public health is obviously great. By training and practice, the dentist should be familiar with the normal anatomy of the oral cavity and hence able to recognize any departure from the normal. He has but to realize that his responsibilities should not end with the care and treatment of the dental apparatus alone, and that in every case in which he is able to discover an early malignant tumor it is probable that he has been instrumental in saving a human life.

Differential Diagnosis

If the differential diagnosis of diseases of the oral cavity (including cancer) is considered from a reasonable perspective, the problem is not necessarily complicated or difficult. In any situation, medical or otherwise, when confronted with the possibility of several dangerous or troublesome eventualities, the sensible person will obviously eliminate the most serious possibilities first, and then proceed to a consideration of the less serious.

A certain and specific diagnosis of cancer, even in advanced cases, can be made only by the microscope. Lacking microscopic confirmation, such a diagnosis can be no more than "tentative" or "clinical." The radical treatment, either by surgery or radiation, which is necessary in most cases of cancer, should be withheld until the diagnosis is proved by the microscope, if such a test is at all possible. No physician is warranted in making a final diagnosis of cancer without biopsy in any case of a superficial or surface growth. Whether or not the lesion looks enough like cancer to warrant taking a specimen for biopsy is a question which sometimes can be settled only by one who has had considerable experience. If properly carried out, the removal of a tissue specimen for biopsy is never a serious procedure in either a benign lesion or a malignant tumor.

The Making of a Biopsy.—For the dentist, the best disposition in most cases of suspected cancer is to refer the patient to a surgeon or a hospital. In some instances, it may seem likely that the patient would disregard any attempt to refer him elsewhere. In the latter case, the dentist himself should be capable of removing a specimen for biopsy and sending it to a qualified pathologist or laboratory.

The procedure is not difficult if the growth is ulcerated and fungating. Ordinarily a small biting specimen forceps should be used or, lacking that, a scalpel. The dentist may find a workable substitute in the form of a small cup-shaped dental rongeur. The specimen should be about 4 or 5 mm. in diameter. Care should be taken that the fragment is not crushed during removal. It should be placed immediately in 70 per cent alcohol and labeled with the patient's name and the anatomic site from which it has been removed.

When extracting teeth from suspected abscesses, the dentist may occasionally find masses of soft tissue clinging to the roots. In these instances, the tooth with the attached fragment should be placed in alcohol and referred to a pathologist.

Armed with a positive biopsy report, the dentist will feel no hesitation in communicating with the patient, or with the members of his family, concerning the seriousness of the diagnosis and the necessity of immediately consulting a physician. No matter how experienced the physician or dentist may be in the clinical observation of cancer, he should insist upon a microscopic confirmation of his diagnosis in all instances.

Syphilis.—More confusion and delay in the diagnosis of oral cancer are caused by syphilis than by any other disease. There is no sure way of differentiating secondary syphilides and gummas of the oral mucous membranes from malignant growths except by biopsy. Another cause of uncertainty is the fact that syphilis and mouth cancer are so frequently associated. For example, almost one-third of all men with cancer of the tongue have chronic syphilis (positive serology), as opposed to about 6 per cent in the male population of the average tongue cancer age (56 years). In the cases in which tongue cancer and syphilis are associated, syphilis has obviously played a prominent role in the etiology by producing a chronic syphilitic glossitis persisting over many years.

One practical conclusion to be drawn from these facts is that one should completely disregard serologic tests for syphilis in the differential diagnosis of an ulcer or tumor of the tongue. Otherwise, diagnostic errors will be made in about one-third of all tongue cancers. Gumma of the tongue (the syphilitic lesion most resembling cancer and indistinguishable from it clinically) is less than one three-hundredths times as frequent as tongue cancer. On the basis of chance alone, the probability of gumma therefore is not great. Some of the most tragic errors in the diagnoses and fatal delays in beginning treatment occur in cases where patients with tongue cancer have been given antiluetic therapy for months and sometimes years under a diagnosis of gumma, simply because the serologic tests were positive. In brief, a diagnosis of gumma should never be made without biopsy to rule out cancer.

Simple Ulcer.—A simple inflammatory ulcer, due to Vincent's organisms or to dental trauma from the jagged surfaces of the teeth, may occur on the tongue or cheek, but this happens far less frequently than is commonly supposed. In such instances there is usually a history of accidentally biting the tongue or cheek, or at least of sudden onset, acutely painful symptoms and healing within a week or ten days. The probability of a sharp tooth by itself causing a chronic benign ulcer of the contactual cheek or tongue has been greatly overemphasized. From the histories of patients applying to the Memorial Hospital, it is plain that the dentist often makes a diagnosis of traumatic ulcer due to irritation from adjacent teeth. Sharp teeth occasionally produce either benign or malignant ulcers of the tongue or cheeks. The contact of teeth with a cancerous ulcer is usually merely coincidental.*

Tuberculosis. — Tuberculous ulcers of the oral mucous membranes occur by secondary implantation of the bacilli from the sputum of patients with pulmonary tuberculosis. These ulcers are usually tender and painful, without marked induration, and the granular surface is

*The earliest medical writings contain descriptions of ulcers of the tongue which were obviously cancer. There can be little doubt that Hippocrates (B.C. 460-370) in his "Prorrheticon" refers to tongue cancer when he states that "chronic ulcers of the tongue are common at the edge" and when he urges that an examination be made for "the presence of sharp teeth in contact with such ulcers." This injunction was repeated by the encyclopedist Celsus (A.D. 178) when he observed that "ulcers which arise at the side of the tongue endure the longest." These early writers invariably commented on the seriousness of ulcers of the tongue, caused by irritation of sharp teeth; and although they advised that the teeth should always be drawn, they observed that the ulcers did not heal and usually resulted fatally.

smooth, unhealthy and yellowish in color. A diagnosis is made by biopsy of the ulcer, which the experienced pathologist can usually interpret as tuberculosis, this test being confirmed by roentgenography of the chest and sputum examinations. A differential diagnosis between tuberculosis and cancer is of great importance, since the proper methods of treatment of the two differ widely. Surgical excision or radiation of a tuberculous ulcer is almost always followed by a rapid progress of the disease, while the simple institutional care for tuberculosis is, of course, unsuited to cancer. In some cases the two diseases exist in the same lesion.

Leukoplakia.—This lesion is a precancerous condition easily diagnosed. It consists of a simple thickening of mucous membranes, similar to that of a callus of the skin, and is recognizable as a whitish, smooth or nodular or even a papillary appearance of the mucous membranes. If uncomplicated, the condition is of little clinical significance. Leukoplakia occurs as a response of mucous membranes (mouth, pharynx, esophagus, etc.) to one or a combination of several forms of chronic irritation, such as syphilis, tobacco, chronic sepsis, avitaminosis, dental trauma, etc. Since its etiology is identical with the main factors in the causation of oral cancer, its presence should serve as a warning to the patient that he is more likely to develop a malignant tumor of the mouth than the average person. All patients with marked leukoplakia should be referred to a physician for periodic observation.

Dental Abscess.—Apical abscess is a lesion frequently encountered in dental practice, the diagnosis of which is readily made roentgenographically. When such abscesses become large and fluctuant, they have considerable resemblance to cancer of the gum or of the maxillary antrum perforating the bone of the palate or the alveolar process. In such cases, the dentist may incise and drain a fluctuant swelling of the upper alveolus and extract teeth under a mistaken diagnosis, and the recognition of cancer may be delayed for weeks or months. Although in some instances the clinical appearance may not be characteristic, a missed diagnosis of cancer can usually be averted if its possibility is kept in mind. If the roentgenograms show marked destruction of the bone of the antral wall, the diagnosis of cancer is almost certain. If the dentist feels that extraction of teeth or incision and drainage is indicated, he should take the precaution of submitting for biopsy a fragment of tissue from the edge of the drainage incision, or from the edge of the wound produced by extraction of teeth.

Radiculodental Cyst and Adamantinoma.—Radiculodental cysts may vary in size from a few millimeters up to several centimeters. Such cysts are benign. The epithelial lining is noninvasive and, if the cyst can be uncovered and kept open, the remaining epithelial lining serves as a covering for bone, similar to the mucous membrane of the gum. Practically all simple, benign, radiculodental cysts are unilocular. When a cystic tumor of the mandible or maxilla can be demonstrated by x-ray examinations to be multilocular, the lesion is probably adamantinoma, or at least a neoplastic growth not capable of cure by simple curettage. The prudent dentist will refer all cases of multilocular cysts for surgical treatment. Many adamantinomas are operated upon by a dentist, teeth extracted, and an attempt made to curet the cyst lining. Such conservative treatment almost always fails in the cure of this disease. Curettage of an adamantinoma releases the growth from its restraining bony walls, and the tumor spreads more rapidly in the overlying soft tissues. The curetted cavity does not heal and becomes infected. Osteomyelitis ensues and effective treatment must then be much more radical, or in some cases it

may even be impossible to remove the disease completely.

Miscellaneous Lesions. — There are many benign lesions of the oral mucous membranes, such as hemangioma, lymphangioma, retention cysts, fibroma, Fordyce's disease, etc., the number and the variety of which are too great to be discussed in detail in this paper. The average dentist is familiar with most of these, and they should constitute little difficulty in diagnosis.

Causative Factors

When cancer occurs, a previously localized group of normal cells growing in orderly, controlled fashion change in character to become rapidly multiplying and malignant, invading and destroying adjacent normal tissues and tending to spread by metastasis widely throughout the system. The exact mechanism by which this change takes place, or its immediate cause, is unknown. It is known, however, that cancer of epithelial tissues occurs more frequently in areas which show signs of having undergone long-standing chronic irritation. The role played by chronic irritation in carcinogenesis can be proved experimentally, by the application of certain chemicals (especially coal tar products) and by clinical studies of large series of cases. In mouth cancer several forms of chronic irritation may be clearly established as contributing factors. These are, in order of their frequency and importance: tobacco, avitaminosis, syphilis and dental disorders. In the literature on this subject, their relative significance has seldom been properly defined.

Tobacco.—It is not within the scope of this paper to discuss in detail the manner by which tobacco contributes to the causation of mouth cancer. Much has been written on the subject. The usual approach to this problem in the past has been an attempt to find a single constituent of tobacco or tobacco smoke which is highly carcinogenic. All attempts to find such a constituent have failed. The most reasonable conclusion is that tobacco and tobacco smoke per se are irritating to living tissues, just as are many other substances, and that the carcinogenic action is neither specific nor due to any one chemical constituent.

The significant role played by tobacco in the production of malignant tumors of the oral cavity depends in considerable part on the prevalence of the habit. In a survey of the tobacco habits of patients with mouth cancer and of healthy controls, still being carried on at the Memorial Hospital, it has been found that in persons of the cancer age without mouth complaint almost 90 per cent of the men and 20 per cent of the women are users of tobacco.

In patients with mouth cancer, however, the prevalence of the tobacco habit averages more than 98 per cent. In some anatomic varieties of oral growths such as in the floor of the mouth, tonsil, etc., the addiction to tobacco is almost 100 per cent. In women with mouth cancer, there are almost 50 per cent more tobacco users than in the normal female population.

In most cases of mouth cancer, however, one can find evidence of more than one form of chronic irritation; therefore it is erroneous to ascribe the lesion in any given case to tobacco simply because the person smokes. Further investigation often proves that the patient also has syphilis and suffers from avitaminosis.

Avitaminosis. — While the prevalence of avitaminosis, as suggested in present-day radio and newspaper advertising, is probably greatly exaggerated, nevertheless various disorders due to dietary deficiencies, especially those of the vitamin B complex, are undoubtedly widespread.

The symptoms of vitamin B deficiency are many and varied, but among the more prominent is chronic inflammation of the oral mucous membranes. Patients

suffering from a deficiency of the vitamin B complex commonly show diffuse atrophy of the papillae of the tongue and subacute inflammation or even acute inflammation with ulceration. In others fissuring occurs at the angles of the mouth (perlèche). In others the mucous membrane of the tongue is deeply fissured and folded (scrotal tongue).

In still other instances, several of these lesions may be combined with widespread leukoplakia. Such clinical findings have been well established as being due to vitamin B deficiency, and, if these degenerative changes have not progressed too far, they may completely disappear, along with other systemic manifestations, after adequate vitamin B complex intake. These forms of chronic irritation and the degenerative changes which accompany them are definitely carcinogenic, as has been demonstrated by the presence of such changes in a high percentage of patients with mouth cancer.

Syphilis.—A common lesion of chronic syphilis is a low-grade glossitis and stomatitis, that is, inflammation of the oral mucous membranes, usually of many years' standing. If chronic irritation is a factor in the etiology of cancer, there should be a higher incidence of syphilis in malignant growths of the mouth. Such an association can be proved statistically. For example, in otherwise healthy men in the 55 to 60 year age group, the general incidence of syphilis is between 4 per cent and 6 per cent. On the other hand, more than 30 per cent of the men in this age group who have cancer of the tongue will be found to have syphilis. In malignant tumors of other anatomic sites in the mouth, the incidence of syphilis is less, but nevertheless consistently greater than the 4 per cent to 6 per cent control figures mentioned above. It would therefore be fair to state that the role played by syphilis in the etiology of tongue cancer can be expressed by the formula: 30 minus 6 equals 24 per cent, but again one must take into consideration that in most of these cases tobacco and vitamin B deficiency disease may also have played a part.

When mouth cancer and syphilis are found in association, the causal relationship is remote. It is not the spirochete itself but rather the long-standing chronic irritation which has produced the growth. The cure of the syphilitic infection in such cases will never result in the disappearance of the cancer itself. Although they were associated etiologically, the two lesions when fully established exist independently of each other. In these cases, syphilis is usually in a chronic or quiescent stage, not otherwise seriously affecting the patient's health.

Dental Disorders.—The admonitions of the early Greeks and Romans, previously mentioned, have a strangely familiar ring in present-day observations concerning the relation between sharp teeth and ulcers of the tongue. The *post hoc ergo propter hoc* association between a cancerous ulcer of the tongue or cheek and a contactual tooth is almost childishly obvious at first thought, but nevertheless is somewhat exaggerated. A cancer of the cheek, or of the gum, or of the edge of the tongue, must necessarily be in contact with teeth, unless the patient is edentulous. Practically all persons of the cancer age have a long history of dental disorders (dental caries, etc.). As a matter of fact, in the Head and Neck Clinic at the Memorial Hospital, about one-third of the patients who have reached the age of 60 are completely edentulous. Since dental disorders of some degree are almost universal, their presence in patients with mouth cancer can hardly be considered of any particular etiologic significance.

Another prevalent idea is that ill-fitting dentures are a common cause of cancer (Fig. 7). Again the question has undoubtedly been over-emphasized. Only rarely does one find signs of chronic irri-

tation in the form of leukoplakia on the lower gum beneath a loose and ill-fitting plate. A commonly observed result of chronic irritation from dental plates is hypertrophy of the gum when the patient masticates almost entirely with one dental plate and a few remaining front teeth in the opposite jaw (all molars missing). Although such hypertrophy is sometimes accompanied by inflammation, it is seldom found to be associated with cancer. I have observed patients whose upper dental plates were very tight-fitting and difficult to remove, so that the dentures have been left in by the patients for several months, without removal, but I have never seen cancer result from such a cause.

If the patients' statements concerning the manner of origin or the cause of their mouth cancers were given full credence, then one would be forced to conclude that trauma from sharp teeth and ill-fitting dentures is a frequent cause of mouth cancer. Further analysis will reveal, however, that in a large percentage of such cases the growths will be found to have their origin in tissues adjacent to, but not in direct contact with, dentures. It is obvious, therefore, that in these cases the dentures themselves could not have caused the growths but rather that the reverse is true—formerly well-fitting dentures became ill-fitting because growing cancer had changed the surface contour (Fig. 7).

In this connection it might be well to consider that such complaints, including the wearing down of teeth, their decay and their loss, are natural rather than abnormal phenomena, and the local tissues seem to tolerate them fairly well.

The Dentist and Mouth Cancer

In the control of any lethal disease, early prophylaxis is more efficacious than later attempts at cure. If a disease is to be prevented entirely, its cause must be eliminated. Since it is not known, the basic cause of cancer obviously cannot be eliminated. In mouth cancer, we can obtain at least partial prophylaxis by reducing or eradicating the contributing causes. The dentist can aid materially in the prevention of mouth cancer by searching for evidence of chronic irritation in his patients, by cautioning them regarding the overuse of tobacco, by referring them for treatment of suspected vitamin B deficiency disease or syphilis, and, last and most important, by discovering early cancerous growths and precancerous lesions.

Diagnosis of Early Cancer.—The greatest assistance that the dentist can contribute to the cancer problem is in the early differential diagnosis of mouth disorders and in the realization of his duty to see that a further examination by a physician is made in doubtful cases. However, it is not enough that the dentist suspect the character of the lesion, or even that he mention this to the patient, suggesting that he consult his physician; the dentist should feel it his responsibility to see that medical advice is actually sought.

What Should the Dentist Do?—When the dentist suspects the presence of cancer in the mouth, he should decide upon the method most suitable in the individual case for the establishing of a diagnosis and the beginning of treatment. In most cases, this problem should be solved by immediately referring the patient to a surgeon or cancer clinic (Figs. 1, 5). If there should be any question that the patient might disregard such advice, the dentist should feel entirely justified in removing a specimen for biopsy examination. Should the report be positive for cancer, the dentist with complete assurance may then discuss the necessity for further advice and treatment with either the patient or the family.

Danger of Extracting Teeth in Cases of Mouth Cancer.—The dentist logically feels that he is qualified above all others

Table 3.—Immediate Extraction of Teeth by the Dentist When Consulted by Patients for the Relief of Symptoms of Undiagnosed Mouth Cancer (Edentulous Patients Omitted from Calculations)

Number of Patients	Probability of Cancer Recognized by Dentist		Probability of Cancer Not Recognized by Dentist	
	Number of Cases	Number of Cases in Which Teeth Were Extracted	Number of Cases	Number of Cases in Which Teeth Were Extracted
112	50	16 (30%)	72	53 (70%)*

*A more specific analysis revealed that, when the dentist did not recognize the nature of cancer of the gums (twenty-nine cases), he extracted teeth in 90 per cent of instances (twenty-six cases).

to determine the indications for extracting teeth, and this is certainly true so far as the teeth themselves are concerned. But when the extraction of teeth might affect the outcome of a serious disease, such as cancer, it is plain that exceptions must be made. In cases of cancer of the gums, the palate or the antrum, the extraction of teeth, except under the direction of the surgeon who is to treat the growth, is always injudicious and usually harmful (Figs. 6, 8). Such extractions may delay or interfere with the treatment of the disease and cause a more rapid extension of the cancerous growth. For example, when a tooth is extracted from within a cancer of the gum, the growth will immediately invade the bone through the tooth socket.

If Table 3 is analyzed, it will be seen that when the dentist does not recognize the presence of cancer he will extract teeth in about 70 per cent of the cases. Apparently a number of dentists do recognize the contraindications for extraction as shown by the fact that, when the possibility of cancer is realized, teeth are extracted in only 30 per cent of the cases.

In suspected mouth cancer, immediate removal of teeth by a dentist cannot produce any favorable effect on the progress of the growth nor has such a procedure much chance of averting the development of an incipient cancer. If a malignant tumor is already present, there is serious danger of permitting deep invasion of the growth through the lacerated gum and tooth socket. In any case, extraction of teeth almost invariably delays a definite diagnosis and the beginning of treatment for the patient, and sometimes even the dentist or physician is inclined to wait for at least two or three weeks or longer to "see what happens."

It is a good rule for the dentist never to extract teeth in cases of suspected mouth cancer except on the advice of the surgeon who is to treat the growth.

Prognosis of Mouth Cancer

Not infrequently, the treatment of early cancer is delayed because the dentist or physician, or the patient or his family, believes the disease to be incurable. A Gallup poll[1] revealed that one United States citizen in four thinks that cancer is incurable. Strangely enough, some physicians and dentists hold almost as gloomy an opinion concerning the curability of this disease. Mouth cancer is among the more favorable from the standpoint of treatment and cure. Growths in this area can often be discovered in their early stages. Even in the advanced stages, the disease frequently remains localized to accessible areas in

1. Time 45:89, April 9, 1945.

Table 4.—Five-Year Cure Rates in Mouth Cancer (Head and Neck Clinic, Memorial Hospital, New York)

Site of Primary Lesion of Cancer	Per Cent of Five-Year Cure Rate in All Cases (All Comers, Both Early and Advanced)	Per Cent of Five-Year Cure Rate in Early Cases (Primary Lesions Less Than 2 Cm.)
Lip	70	86
Tongue	28	55
Floor of mouth	25	50
Mucosa of cheek	29	60
Palate (hard and soft)	31	57
Gums	26	38
Tonsil	18	40

the mouth or cervical lymph nodes, and cure can be accomplished in a fair percentage of cases.

The most recently calculated cure rates for several anatomic varieties of oral cancer, obtained at Memorial Hospital, New York, are found in Table 4. The figures presented in this table clearly indicate the importance of early diagnosis in mouth cancer. It will be noted that, when the primary lesion is less than 2 cm. in diameter, the chance of cure is almost double that which can be obtained in all comers when the more advanced cases are included.

Summary

Symptoms of early mouth cancer often suggest to the layman that there may be some trouble with the teeth, so that it is natural for him to consult a dentist first in such cases. Accordingly, it is the dentist on whom the initial responsibility for the detection of a malignant growth in the mouth is often placed and to whom the opportunity for saving lives by aiding in the early diagnosis will frequently present itself. It is to the interest of public health, therefore, that literature and educational programs be made available to him.

If the possibility of cancer is constantly kept in mind, few missed diagnoses will occur. The dentist should make a biopsy in any case of suspected intra-oral cancer if there is any question that a patient may disregard the suggestion that he seek medical advice. The dentist should never extract teeth if there is any suspicion of mouth cancer, except on advice of the physician who is to treat the growth.

The concept that cancer is incurable is untenable. Such an erroneous belief, still widely prevalent, is at present based on prejudices of long standing together with a paucity of accurate facts about cancer available to laymen and to dentists and other professional groups.—*737 Park Avenue.*

THE PSYCHOSOMATIC ASPECTS OF DENTAL PROBLEMS

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Dentistry is a highly developed specialty dealing with one aspect of the organism. The dental or medical specialist is often inclined to regard the oral structures as a peripheral part of the body, bearing little relationship to the rest. Modern medicine has come to the realization that the human body cannot be treated in terms of a mere sum of its different parts, but must rather be dealt with in terms of the psychophysiologic aspects of the organism as a whole.[1, 2] According to Coghill,[3] studies of the behavior of the embryo from its beginning lead inevitably to the concept that the organism is primarily a unit, not an aggregate. Wilson[4] states that the cell cannot be regarded as an isolated and independent unit. The only real unity is that of the organism, and its cells, as long as they remain in continuity, are to be regarded not as separate structural units, but as specialized centers into which the living body resolves itself.

Osteogenesis, which includes odontogenesis, has been interpreted in terms of this organismal concept.[4] According to this general interpretation, osteogenesis is a function primarily of the organism as a whole, consisting of the growth and progressive internal differentiation of a single bone-forming individual. This differentiation often involves the branching of the living mass into subordinate and semidependent parts—the cells. Since the subdivision is rarely complete, all parts remain in connection, and the whole continues to act as a unit. Thus, development is not essentially a process by which multiplying elementary units form a new whole, but rather the resolution of one whole into numerous parts. It should be thought of not as a multiplication and cooperation of cells, but rather as a differentiation of protoplasm. Entering into these physiologic processes as an integrative factor is the nervous system, including the higher cerebral centers. It is the purpose of this paper to demonstrate that the teeth and other oral structures enter into the totality of the organism from a psychosomatic standpoint.

Dental Factors in Psychopathology

Psychosomatic Aspects of Oral Pain.—The intimacy of the oral region with the personality is demonstrated in the projection of personality disorders to the teeth and oral structures. Subconscious tensions and conflicts may manifest themselves as pain or atypical neuralgia in the oral region.[5, 6, 7] Graven[8] has reported several cases in which there were

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1. Korzybski, Alfred: Science and Sanity. Lancaster, Pa.: Science Press Printing Co., 1933, p. 123.

2. Jelliffe, S. E.: Neuropathology of Bone Disease. Tr. Am. Neurol. A., 1923, p. 419.

3. Coghill, G. E.: Early Development of Behavior in Amblystoma and in Man. Arch. Neurol. & Psychiat. 21:989, May 1929.

4. Irwin, O. C.: Amount and Nature of Activities of Newborn Infants Under Constant External Stimulating Conditions During First 10 Days of Life. Genet. Psychol. Monogr. 8:79-81, July 1930.

5. Facial Neuralgias. (Wilfred Harris, Editor.) New York: Oxford University Press, 1937.

6. Schultz, J. H.: Psychotherapie. Fortschr. f. Zahnhlk. 2:704, August 1929.

7. Weiss, Edward: Psychosomatic Aspects of Dentistry. J.A.D.A. 31:215, February 1, 1944.

8. Graven, P. S.: Series of Clinical Notes on Headache. Psychoanalyt. Rev. 11:324, July 1924.

psychic factors in toothache. A young woman complained of unilateral pain involving several teeth and confined to the maxillary region. The pains alternated daily from the left to the right side. The dentist was unable to give relief. The general clinical picture involved pains in the joints and muscles. Under psychoanalytic treatment, the condition was cured. Graven diagnosed this condition as a form of conversion hysteria. The explanation lies in the fact that, if emotional tension cannot be diverted through normal channels, a physical manifestation or "conversion" of this psychic energy will occur.

The second case suggests another mechanism that may be involved in the psychopathology of dental pain.

Mr. D. was awakened one night by a most painful tooth, but, strange to say, he did not know which tooth. And then he became aware that the pain had occurred simultaneously with a dream and ended at once with the conclusion of the dream. The dream pictured the analyst as a dentist probing about in a painful cavity in a tooth; i.e., probing the roots of his complex which happened to be one of extreme sadism. The toothache was merely of incidental occurrence in the midst of a long analysis.

In many cases, interpretation of the etiology of pain in the oral region may be complicated by psychogenic factors. Hysteriacs may subconsciously exaggerate the symptoms of mild temporomandibular disturbances. Glossodynia, which presents a picture of a more or less constant group of indefinable sensations (burning, itching, boring) localized at the tip or border of the tongue, is often a psychoneurotic manifestation. Certain cases of trigeminal neuralgia may have a psychogenic basis.[5] Lungwitz[9] and Schultz[6] have discussed some of the factors involved. It has been observed that emotional strain may precipitate an attack in certain cases of recurrent trigeminal neuralgia.[10] Gill[11] reported an interesting case of trigeminal neuralgia which developed during a severe emotional crisis. Medical therapy failed to relieve the condition. An alcohol injection gave temporary relief, but was followed by a similar neuralgia of the opposite side, which had not been previously affected.

Polysurgical Addiction.—There are psychoneurotic persons who are "polysurgery" addicts.[12, 13, 14] People who desire surgical operations of various types may do so under the influence of an illogical desire to be rid of something "impure" or "toxic," or may be punishing themselves by way of retribution. They usually have vague aches and pains and often play into the hands of supporters of the focal infection theory; which inevitably results in surgical intervention. It is apparent that, in questionable cases, it would be wise for the dentist to inquire of the patient as to the frequency of previous surgical procedures. Even the most astute clinician is often misled by the psychoneurotic.

Occlusal Neuroses.—It is natural to focus attention on minor defects, such as the rough ends of a cusp, but neurotic persons may give undue attention to these defects. Mild cases of occlusal trauma may attract subconscious attention, which results in the habit of grinding the teeth, especially during sleep or

9. Lungwitz, H.: in Heinrich, E.: Das Organum Dentale und die Psychogenese der Organischen Krankheiten. Deutsche Monatschr. f. Zahnhlk. 28:81, January 1928.

10. Lippman, C. W.: Recurrent Trigeminal Neuralgia Associated with Cyclic Scotoma. J. Nerv. & Ment. Dis. 86:680, December 1937.

11. Gill, A. W.: Psychology of Mouth and Teeth. Brit. D. Rec. 61:175, June 1941.

12. Menninger, K. A.: Polysurgery and Polysurgical Addiction. Psychoanalyt. Quart. 31:173, April 1934.

13. Menninger, K. A.: Man Against Himself. New York: Harcourt, Brace and Co., 1938.

14. Weiss, E., and English, O. S.: Psychosomatic Medicine. Philadelphia: W. B. Saunders Co., 1943.

emotional stress.[15] Occlusal habit neuroses are of great significance in the etiology of periodontal disturbances. Often, the individual is not aware of his nocturnal bruxism and is at a loss to know why his jaws ache when he awakes.[16] It is not difficult to see why mechanical procedures often fail to alleviate such neuroses. In order to cure this somatic manifestation of a psychologic ill, it is necessary to treat the basic emotional disorder rather than its somatic outlet. Perversion of occlusal function is probably more frequent than is generally acknowledged. Several characteristic cases have been related by Frohman.[17] One of his psychiatric patients was a woman who had responded favorably to surgical periodontal treatment. Her original condition returned, and the dentist soon recognized that the periodontosis resulted from clamping the jaws. Under psychotherapy, this condition was relieved. Frohman says, "Her dentist was astonished, the patient was very grateful and the analyst was surprised."

The second case concerned a man aged 43 who had developed the habit of pounding his teeth together. He pounded his anterior teeth so forcibly that extraction was imperative. As the patient was not aware of his occlusal habit, the fixed partial denture made in replacement was pounded loose. Surgical periodontal treatment had previously been performed with excellent temporary results, but both of these conditions persisted. Psychiatric treatment was instituted. The analyst finally succeeded in bringing some of the subconscious processes involved in this condition closer to the surface of the patient's consciousness. A conscious control over masticatory movements finally resulted. Bleeding of the gums and looseness of the teeth were relieved, and stress on the fixed partial denture was lessened. Subjectively, the patient reported a complete recovery. Objectively, the dentist considered a complete cure effected.

Personality Disorders in Relation to Dentistry.—Thus far, only the oral manifestations of psychologic disturbances have been discussed. There are striking examples of the effects of oral disorders on the psyche. Weiss[14] has discussed this problem at length. Unsightly teeth or loss of teeth and ill-fitting dentures may have an undesirable effect upon the mental life. Many edentulous persons shun society as long as they are without dentures. Children often become problems because of self-consciousness over dentofacial abnormalities. Adler[18] argues that neurotic conditions may have as their basis some actual organic inferiority. It must be remembered that the emotional response to these defects differs greatly among individuals.

From the standpoints of orthodontics[19, 20] and prosthetics,[14] the problem of esthetics has great significance to the mental as well as to the dental health of the patient.

The following case shows how dentofacial deformities may be instrumental in the development of psychotic tendencies and how a dentist can aid in the mental adjustment needed.[21]

A man aged 68, with an irrelevant family history, several years earlier had been oper-

15. Tishler, Benjamin: Occlusal Habit Neuroses. D. Cosmos 70:690, July 1928.

16. Frohman, B. S.: Ueber die Psychischen Wurzeln der Okklusionsstörungen. Psychoanalyt. Praxis. 2:78, April 1932.

17. Frohman, B. S.: Occlusal Neuroses. Application of Psychotherapy to Dental Problems. Psychoanalyt. Rev. 19:297, July 1932.

18. Adler, A.: Study of Organ Inferiority and Psychical Compensation. New York: Nervous and Mental Disease Publishing Co., 1917.

19. Wile, I. S.: Relation of Psychology to Orthodontia. Internat. J. Orthodontia 15: 573, June 1929.

20. Maller, J. W.: Child Psychology as Applied to Orthodontia. Internat. J. Orthodontia 15:585, June 1929.

21. Sperber, I. J.: Dental Deformities and Mental Hygiene. Psychiat. Quart. 4:444, July 1930.

ated upon for an oral carcinoma. The hard palate on the right side, including the alveolar ridges, and part of the malar bone had been removed. These changes resulted in a severe disfigurement and gave a harsh nasal tone to the voice. The condition was accentuated because the patient was completely edentulous. He had difficulty in talking and eating, and food passed through the palatal perforation into the nasal cavity. A state of depression with suicidal tendencies and a feeling of hopelessness ensued. Upper and lower dentures with an obturator and intermaxillary springs for stability were made. With these dentures the patient was able to talk more easily and distinctly and to masticate without passage of food through the nose. Part of the summary of the staff report is as follows: "This psychosis was characterized by a period of depression, largely a reaction to his facial deformity and due to the inability of the patient to masticate his food and to talk properly. There was no history of previous depression or serious maladjustment." Within two years, the patient had improved considerably, and when last examined was more cheerful and better adjusted.

The relationship of psychogenic conditions to the etiology of dental pathosis is a relatively unexplored field. There is evidence of the relationship between psychic processes and oral function. The fact that psychic stimuli can result in physiologic changes is explained by the intimacy between the autonomic and central nervous systems. A large amount of experimental evidence has confirmed this relationship.[22, 23, 24] The cerebral cortex, which is designated as the seat of higher nervous processes known as "mind," is linked by nervous pathways to the mesencephalon, or midbrain. At the floor of the mesencephalon is the hypothalamus containing nerve centers which coordinate the activities of the autonomic system. Clinical and experimental work have demonstrated that this system, which regulates the vegetative processes, reflects psychic activity.[25, 26, 27] Some of the general vegetative processes influenced by the autonomic system include metabolism, temperature regulation, vascular changes and endocrine activities.

The psychic influences on salivation are well known. The oral dryness of anxiety and the drooling of the idiot are familiar examples. According to Heyer,[28] the tongue may become coated during psychic excitement. The mechanism behind this process is not clear, but probably it is mediated through salivary changes. Trimble[29] and others[30, 31] believe that the quantity of saliva is an important factor in caries susceptibility and immunity. From a qualitative standpoint, titratable alkalinity, ammonia, calcium and phosphorus are considered important. The salivary glands receive both sympathetic and parasympathetic fibers, which control the secretory rate through vasoconstriction and vasodilation. Psychic influence on secretion is exerted through this autonomic innerva-

22. Clark, W. E. I., et al.: Hypothalamus. Edinburgh: Oliver and Boyd, 1938.

23. Notkin, J.: Recent Progress in Psychosomatic Medicine. J. Nerv. & Ment. Dis. 94:593, November 1941.

24. Hunsicker, W. C., and Spiegel, E. A.: Conduction of Cortical Impulses to Autonomic System. Proc. Soc. Exper. Biol. & Med. 31: 974, May 1934.

25. Kennard, M.: Cortical Influence on Autonomic Nervous System. Handb. der Neurol. Berlin: Julius Springer, 1937.

26. Kuntz, A.: Autonomic Nervous System. Philadelphia: Lea & Febiger, 1934.

27. Cannon, W. B.: Bodily Changes in Pain, Hunger, Fear and Rage. Ed. 2. New York: Appleton Co., 1929.

28. Heyer, G. R.: Psychogenese und Psychotherapie Körperlicher Symptome. (O. Schwarz, Editor.) Vienna: Julius Springer, 1925.

29. Trimble, H. C.; Etherington, J. C., and Losch, P. K.: Rate of Secretion of Saliva and Incidence of Dental Caries. J. D. Res. 17:299, August 1938.

30. Box, H. K.: Liquefying Amylose in Human Saliva, Amylopectin and Dental Caries. Toronto: Canadian Research Foundation, 1938.

31. Cox, G. J.: Unpublished data.

tion. The emotion of fear may result in a sympathetic domination during which salivary flow is inhibited because of vasoconstriction.

Brunacci and De Sanctis[32] found that there is a reduction in salivary secretion during mental activity. The subjects were stimulated once a minute with a dilute solution of acetic acid when at rest, and when translating from a foreign language. Winsor[33] measured the parotid secretory rate during mental activity and noted a reduction in salivary output. He concludes that the duration of inhibition depends in part on the nature of mental activity. This inhibition during mental activity can probably be explained in terms of the restraining influence of cerebral activity upon visceral function. Winsor also found that the introduction of incentive during his tests is accompanied by a pronounced decrease in the secretory rate.

Wittkower and Pilz[34] studied certain qualitative and quantitative salivary changes during emotional states and found that quantitative changes may be either in a plus or a minus direction, depending on the personality type. The rhodan and nitrogen content of the saliva may also be decreased or increased under emotional influence. In thirty-eight individuals of the same personality type, the nitrogen fell from 72.8 to 40.32 mg. per hundred cubic centimeters. After the emotion passed, it rose again to 70.2. The rhodan dropped during emotion from 0.21 to 0.11 mg. per hundred cubic centimeters. Aside from thickening or thinning, a saliva of an entirely different composition is produced. Rich[35, 36] has attempted to correlate the salivary pH with certain personality factors. His data indicate that the most excitable people have the least acid saliva. In a series of tests with thirty-nine undergraduate students, a positive correlation of plus 0.28 was found between salivary pH and emotional excitability. Although many of the correlations are low, the work of Rich seems to show a relationship between personality factors and salivary pH.

Starr[37] has demonstrated a decrease in hydrogen-ion concentration of mixed saliva concomitant with emotional excitement. In one series of tests, the pH increased to an average of 7.20 during emotion, and dropped after the subjects had become calm, to 6.73. The average initial salivary pH was 6.75. Starr states that the changes in pH are primarily caused by changes in the carbon dioxide tension of the alveolar air. Strongin and Hinsie[38] have observed parotid secretions in manic-depressives. Since previous work had indicated a change in salivary secretion beyond a normal range of variation during emotional states, these workers decided to determine the effect of psychogenic problems involving emotional disorders upon the secretory rate of the parotid gland. In the manic-depressive patients, during the manic phase, the

32. Brunacci, B., and De Sanctis, E.: Influenza Inibitrice dell' Attivita Psichica Sulla Quantita e Qualita Della Saliva Secreta. Arch. di. Fisiol. 12:441, 1914.

33. Winsor, A. L.: Effect of Mental Effort on Parotid Secretion. Am. J. Psychol. 43:434, July 1931.

34. Wittkower, E., and Pilz, W.: Ueber affektiv-somatische Veränderungen; zur affektiven Beeinflussbarkeit der Speichelsekretion. Klin. Wchnschr. 11:718, April 23, 1932.

35. Rich, G. J.: Biochemical Approach to Study of Personality. J. Abnorm. Psychol. 23:158, July-September 1928.

36. Rich, G. J.: Body Acidity as Related to Emotional Excitability. Arch. Neurol. & Psychiat. 20:589, September 1928.

37. Starr, H.: Hydrogen Ion Concentration of Mixed Saliva Considered as Index of Fatigue and Emotional Excitement. Am. J. Psychol. 33:394, June 1922.

38. Strongin, E. I., and Hinsie, L. E.: Parotid Gland Secretions in Manic-Depressive Patients. Am. J. Psychiat. 94:1459, May 1938.

secretory rate fell within the normal range. The depressed state showed a diminution in salivary output and also a lower pH.

These workers have also observed the parotid secretory rate in schizophrenics.[39] It has been clinically observed that schizophrenics often show an increase in salivation.[40, 41] In an early psychotic group which exhibited tense anxiety, the secretory rate for a five-minute period ranged from 0.007 to 0.002 cc., as compared with the normal range of 0.02 to 0.15 cc. In the late psychotic group, the average secretion was 0.38 cc. for a fifteen-minute period. Xerostomia, which is the diminution or arresting of salivary secretion, is not an infrequent organ neurosis.[42] Bieber and Tarachow[43] report a case of xerostomia in a woman suffering from an anxiety neurosis. During a four months' period, there was marked and constant dryness of the mouth, especially pronounced during states of panicky depression. In response to a different emotional situation, profuse salivation occurred. For a time, there were alternating periods of ptyalism and aptyalism.

The work of Finesinger and Sutherland[44, 45] has demonstrated the relationship between mental states and the conditioned salivary response. In a study of psychoneurotic persons, they have been able to correlate salivary reflex pattern changes with the emotional state. It is believed that human salivation can be used as a precise means of measuring cerebral functions.[46] From the evidence presented, it can be inferred that the salivary mechanism is extensively integrated with the mental life. Individual differences in response to psychic stimuli can be partly explained in terms of autonomic balance.[47] The studies of Wenger[48] have indicated that differences in autonomic function can be attributed to the entire group rather than to a few extreme cases. Wenger, in studying a group of school children, made observations on the salivary rate as correlated with autonomic balance. A study of the incidence of dental caries in these children would have been interesting.

Thoma[49] states that, in a general way, the constituents of the saliva follow those of the blood, aside from the secretory products, such as mucin and ptyalin. Gregersen[50] has shown that injections of various substances into the external carotid artery result in corresponding changes in the quality of secretion of the submaxillary gland. It has also been demonstrated that nitrogenous metabolites, such as blood urea, and creatinine have a constancy of ratio with the same

39. Strongin, E. I., and Hinsie, L. E.: Parotid Secretory Rate in Schizophrenic Patients. J. Nerv. & Ment. Dis. 87:715, June 1938.

40. Hüffler: Ueber die Katatonische Anfalle. Allg. Ztschr. f. Psych., 65, 1908.

41. Knapp, A.: Körperliche Symptomen bei Funktionellen Psychosen. Arch. f. Psych. 44:709, 1908.

42. Curschmann, H.: Ueber Xerostomie. München Med. Wchnschr. 76:269, February 15, 1929.

43. Bieber, I., and Tarachow, S.: Autonomic Symptoms in Psychoneurotics. Psychosom. Med. 3:253, July 1941.

44. Finesinger, J. E., and Sutherland, G. F.: Salivary Conditional Reflex in Man. Tr. Am. Neurol. A., 1939, p. 50.

45. Finesinger, J. E., and Finesinger, S. L.: Modification of Krasnogorski Method. J. Lab. & Clin. Med. 23:267, December 1937.

46. Krasnogorski, N. I.: Bedingte und Unbedingte Reflexe im Kindersalter und ihre Bedeutung fur die Klinik. Ergebn. d. inn. Med. u. Kinderh. 36:613, 1931.

47. Eppinger, H., and Hess, L.: Vagotonia. New York: Nervous and Mental Disease Publishing Co., 1915.

48. Wenger, M. A.: Measurement of Individual Differences in Autonomic Balance. Psychosom. Med. 3:427, October 1941.

49. Thoma, K. H.: Oral Pathology. Ed. 2. St. Louis: C. V. Mosby Co., 1944, p. 555.

50. Gregersen, M. I., in Macleod, J. J. R.: Physiology in Modern Medicine. Ed. 9. St. Louis: C. V. Mosby Co., 1941, p. 1078.

substances in the saliva.[51, 52] It was observed that, after injections of potassium chloride and calcium chloride, the calcium and potassium content of the saliva rose.[53] It is important to learn the mechanism by which subclinical changes in the blood elements are brought about. In clear-cut pathologic conditions such as hyperparathyroidism or nephritis, the reason for the rise of calcium or urea in the saliva is apparent. In dealing with dental disorders, the main concern lies in variations of bodily metabolism which are not, for the most part, the result of pathologic processes accompanied by morphologic evidence of disease.

The changes to be discussed are concerned with some of the blood and salivary variations considered to be of importance in caries or periodontal disturbances. Glaser[54, 55, 56] has made determinations of blood calcium in normal, psychoneurotic and psychotic persons. In normal persons, calcium determinations made on different days varied from 0.2 to 0.5 mg. per hundred cubic centimeters. In psychoneurotic and psychotic patients, the differences were much greater, ranging from 1.2 to 5 mg. Glaser believes that these changes are the results of variations in sympathetic-parasympathetic balance brought about by psychic stimuli. These findings indicate that the level of blood calcium is altered during mental states. Similar experiments have shown a decrease in blood calcium under the influence of various emotions of fear.[57] These findings have also been confirmed by Kretschmer and Krüger.[58] Henry and Ebeling[59] found that there is a relative decrease of blood calcium and phosphorus in tense, agitated, depressed states. The variability of blood calcium is much greater in psychoneurotic than in normal children, according to the findings of Kallinikova.[60] It has also been found that calcium blood levels are lowered during the depressed state in manic-depressives.[61] Disturbances in ammonia regulation during emotional states have also been reported.[62, 63] Recent studies have indicated that salivary ammonia is important in caries susceptibility and immunity.[64] On the basis of extensive

51. Updegraff, H., and Lewis, H. B.: Quantitative Study of Some Organic Constituents of Saliva. J. Biol. Chem. 61:633, October 1924.

52. Cowgill, G. R., in Macleod, J. J. R.: Physiology in Modern Medicine. Ed. 9. St. Louis: C. V. Mosby Co., 1941, p. 963.

53. DeBeer, E. J., and Lewis, D. W.: Inorganic Composition of Parotid Saliva of Dog, and Its Relation to Composition of Serum. J. Biol. Chem. 95:671, March 1932.

54. Glaser, F.: Blood Calcium in Neurotic. Med. Klin. 20:1237, September 1924.

55. Glaser, F.: Die Bedeutung der Serumkalkschwankungen bei Hypnosen, Funktionellen Neurosen und Fieber. München Med. Wchnschr. 72:373. March 1925.

56. Glaser, F.: Psychische Beeinflussung des Blutserumkalkspiegels. Klin. Wchnschr. 3: 1492, August 1924.

57. Povorinskij, J. A., and Finne, W. N.: Der Wechsel Zuckergehaltes des Blutes unter dem Einfluss einer Hypnotisch Suggerierten Vorstellung. Ztschr. f. d. ges. Neurol. u. Psychiat. 129:135, 1930.

58. Kretschmer, M., and Krüger, R.: Ueber die Beeinflussung des Serumkalkgehaltes in der Hypnose. Klin. Wchnschr. 6: 695, April 1927.

59. Henry, G. W., and Ebeling, W. W.: Blood Calcium and Phosphorus in Personality Disorders. Arch. Neurol. & Psychiat. 16:48, July 1926.

60. Kallinikova, M. P.: Magnesium in Blood of Psychoneurotic Children. Potassium and Calcium in Blood of Psychoneurotic Children. Russian J. Physiol. 13:606, 1930.

61. Klemperer, E.: Untersuchungen über den Stoffwechsel bei Manischen und Depressiven Zustandbildern. Jahrb. f. Psychiat. u. Neurol. 43:32-63, 1926.

62. Hammett, F. S.: Observations on Relation Between Emotional and Metabolic Stability. Am. J. Physiol. 53:307, September 1920.

63. Jankowska, H.: Contribution á L'etude des Modifications Biochémiques au Cours des Émotions. Encéphale. 26:204, March 1931.

64. Grove, C. J., and Grove, C. T.: Chemical Study of Human Saliva Indicating That Ammonia in Human Saliva Is Immunizing Factor in Dental Caries. J.A.D.A. 22:247, February 1935. Landwehr, G., and Landwehr, A.: Deamination of Amino Acids by Human Oral Flora: Its Role in Dental Caries Immunity. Science 101:230, March 1945.

experimental work, Anderson and Parmenter[65] suggest that prolonged emotional states may result in a chronic imbalance of the external chemical (nutritive) environment of the body cells. Involved in this disturbance of chemical equilibrium are the ions of potassium and calcium as well as other substances. This interpretation presents a working hypothesis concerning the psychophysiology of some of the changes that have been discussed.

There are general systemic considerations which may be of significance as regards oral health and development. Defective carbohydrate or basal metabolism and endocrine disorders are believed to underlie the systemic background of periodontosis.[66] There seems to be general agreement from various sources that carbohydrate metabolism can be altered by psychic stimuli.[67, 68] Diethelm[69] states that normal as well as psychoneurotic persons exhibit a variance in glucose tolerance under emotional stress. Although evidence is not conclusive, there seems to be a correlation between emotional state and basal metabolic rate.[70] Thyroid and pituitary endocrinopathy have been associated with periodontal disease. Cushing[71] has reported a series of case histories illustrating the effects of psychic trauma upon pituitary function. Weiss[14] discusses this problem under the heading anorexia nervosa. It can be definitely stated that psychic factors are very important in the etiology of thyroid disorders, especially hyperthyroidism,[72, 73, 74] and from this it is reasonable to assume that mild endocrinopathy induced by emotion is of importance in the etiology of periodontosis. Sachs has discussed this problem at length.[75] According to Thoma,[76] hyperfunction of the adrenal cortex may result in hypercalcification of tooth structure as well as in acceleration of development. Likewise, adrenal hypofunction may cause retarded development of the dentition. From a psychosomatic standpoint, this is important in the light of recent studies which indicate that the adrenals are perhaps the most important part of the endocrine system influenced by emotional disorders.[65] Disturbances in emotional equilibrium can cause cortical hypofunction or hyperfunction, and it is possible that these changes may influence permanent tooth structure during the adolescent and preadolescent periods of growth and development.

From a more general point of view, it is interesting to speculate on the effects of psychic trauma on growth and development of the teeth and jaws. The neural integration of bone structure and suggestions concerning psychogenic factors in bone disease have been reviewed by Jelliffe.[2] Decreased transverse facial dimensions are often seen in children living under adverse social conditions. It

65. Anderson, O. D., and Parmenter, R.: Long Term Study of Experimental Neurosis in Sheep and Dog. Psychosom. Med. Monogr. 2, Nos. 3 and 4. Menasha, Wis.: George Banta Publishing Co., 1941, pp. 96-98.

66. Thoma, K. H.: Op. cit., pp. 714-715.

67. Woodyatt, R. T.: Psychic and Emotional Factors in General Diagnosis and Treatment. J.A.M.A. 89:1013, September 24, 1927.

68. McCowan, P. K., and Quastel, J. H.: Blood Sugar Studies in Abnormal Mental States. Lancet 2:731, October 1931.

69. Diethelm, O.: Influence of Emotions on Dextrose Tolerance. Arch. Neurol. & Psychiat. 36:342, August 1936.

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71. Cushing, Harvey: Psychic Disturbances Associated with Disorders of Ductless Glands. Am. J. Insan. 69:965, 1913.

72. Ewalt, J.: Psychosomatic Problems. J.A.M.A. 126:150, September 16, 1944.

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75. Sachs, H.: Die Psychogenen Faktor bei Paradontosen. Vrtljahrsschr. f. Zahnhlk. 42:508, 1926.

76. Thoma, K. H.: Oral Diagnosis. Ed. 2. Philadelphia: W. B. Saunders Co., 1943, pp. 146, 154.

has been found that preganglionic section of the cervical sympathetic nerve results in an increase in deposition of calcium in the permanent teeth and tooth germs.[77] Similar results have been obtained by extirpation of the cervical ganglion.[78] Vasodilatation, as well as neurochemical factors, may be involved. It is possible that psychic effects can be mediated directly through the nervous pathways, as well as indirectly through endocrine control. Development of the teeth and jaws may be related to psychic as well as to nutritional and hereditary conditions.

Several cutaneous diseases having oral manifestations are etiologically related to emotional states, including herpes labialis (herpes simplex), urticaria, angioneurotic edema and lichen planus. Polland[79] has discussed some of the psychogenic factors in herpes labialis, commenting that this condition often develops in response to an unpleasant emotional experience. Heilig and Hoff[80] have made similar clinical observations. It is their belief that, in addition to the herpes virus, there must be an emotional condition which lowers the defense mechanism sufficiently to permit the virus to become effective. There are numerous references to the emotional factors in urticaria.[81, 82, 83] Schultz[6] reported a case of angioneurotic edema caused by psychic conditions. One of his patients, a man aged 26, developed a prominent swelling of the left side of the face as a result of psychic trauma. From a careful study of sixty-four cases, White[84] concludes that there are important psychogenic factors in the etiology of lichen planus. Sack[85] has given numerous clinical references concerning these factors. He relates the case of a woman physician who developed lichen planus a few days after a severe psychic trauma. This disorder defied all therapy until psychoanalytic treatment was given. The physiologic basis of these cutaneous disorders has not been clearly explained. Acid-base equilibrium, vasomotor response to emotion and calcium-potassium balance in relation to the sympathetic-parasympathetic mechanism may be involved.

The psychic factors in dental problems require more careful consideration. Systematic study should be made of the responses of different personality types, as well as the psychic factors in dental disorders. Concerning the latter, clinical reports have been fragmentary. Psychic factors in the etiology of caries have been mentioned.[86, 87] Heinrich[88] has pre-

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86. Briggs, E. F.: Psychologic Factor in Dental Caries. Oral Hyg. 26:341, March 1936.

87. Appleton, J. L. T.: Control of Pain in Dental Practice. Philadelphia: J. B. Lippincott Co., 1940, p. 56.

88. Heinrich, E.: Ein Fall von Identifizierung in der Zahnheilkunde. Internat. Ztschr. f. Psychoanal. 14:528, 1928.

sented a case which illustrates the relationship between psychic conditions and dental prosthesis. He also observed clinically that inflammation and bleeding of gums and looseness of the teeth may have a psychogenic basis.[89] The psychophysiologic mechanisms behind these conditions are not clear.

The unity between psychic and organic function is apparent.

> There is no such thing as a purely psychic illness, or a purely physical one, but only a "living extent" taking place in a living organism, which is itself alive only by virtue of the fact that in it psychic and somatic are united as unity. . . . We can no longer separate either nervous or organic, or functional or organic. If we think in terms of disturbed function the only adequate concept is that changes take place which are reversible and irreversible in a series terminating in the gross anatomical.[90]

It is apparent that there are certain psychogenic factors in the etiology of dental ills. Dentistry, if it is to fulfill its obligation as a health service, must be prepared to recognize the possibilities of a psychic as well as a physical and physicochemical etiology in dental disturbances. From the therapeutic viewpoint, this means that attempts to treat by purely mechanical means conditions in which there are psychic components, are inadequate. We must, therefore, make every effort to equip ourselves with the knowledge necessary to understand the relationship between the psychic and somatic processes in dental health and disease.—*4559 Scott Avenue.*

89. Heinrich, E.: Das Organum Dentale und die Psychogenese der Organischen Krankheiten. Deutsche Monatschr. f. Zahnhlk. 28:81, January 1928.

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DENTAL EDUCATION AND DENTAL PERSONNEL

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Dental education and dental personnel are inseparably associated. The character, quality and range of the dental educational program are basic to the provision of an adequate supply of practitioners to meet the dental needs and demands of the American people. This intimate relation of education and practice is the result of an evolutionary process which has been going on for more than one hundred years. The apprenticeship system of training and the commercial dental school, designed deliberately as a business enterprise for the profit of its owners, have fortunately disappeared entirely. All of the states and the District of Columbia have clear-cut statutes defining the practice of dentistry and limiting such practice to persons duly licensed by law.

Part 1: History and Development of Dental Education in America

No young man or woman may now enter the dental profession anywhere in the United States without having graduated from a dental school maintaining a standard satisfactory to the board of dental examiners or other duly authorized agency of the state in which he or she desires to practice. The various state laws and the regulations set up under the laws fixing the required minimum of both predental and professional education differ greatly in their specific provisions. The fact is, however, that the program of education agreed upon by the schools and fostered and promoted by the Council on Dental Education determines entirely the qualifications of the prospective dentist up to the time he seeks admission to a state licensing examination. No matter how loosely a state statute may be drawn or how disposed a board of examiners may be to lower the bars, every candidate for a license must meet the common standards set by the existing schools because there is no other way by which he can secure a dental education. Education in a foreign country, except in Canada, which maintains standards substantially equivalent to those in the United States, does not answer. The prevailing procedure of examining boards and other state agencies is to require additional study in an American dental school, as well as citizenship, of all foreign applicants. The customary practice of the schools in this country is to require two additional years of study by all foreign candidates, except from Canada, for an American dental degree.

It is clear, therefore, that the one avenue through which one may acquire a dental education in the United States is by pursuing successfully a predental course in liberal arts, including certain specified subjects, covering two academic years in an approved liberal arts college, and by graduation from an approved dental school which requires a course covering four academic years. Moreover, in practice, though not by law, both the predental and the professional courses are planned to meet the standards set by the Council on Dental Education of the American Dental Association, the recognized accrediting agency of the profession.

The chief glory of the first hundred years of dental education in the United States is the settled fact that there are

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no fly-by-night institutions offering short cuts to dental education. Not all other professions are yet free of commercial educational enterprises or of spurious teaching agencies of a substandard character. This fortunate position of dental education is not always clearly understood. It has come about over the years through the intelligent cooperation and statesmanlike undertaking of the three agencies most vitally concerned: the American Dental Association, the American Association of Dental Schools and the American Association of Dental Examiners.

The evolution and development of dental education in America stem from the establishment of the Baltimore College of Dental Surgery in 1840, the first formally organized dental school in the world. Schools grew slowly in number and output before the Civil War. The first university school was established at Harvard University in 1867. For many years proprietary institutions outstripped university schools. The peak in the number of schools in operation was reached at the turn of the century. There were fifty-seven schools in 1900 and 1901. From 1841 to 1869 the number of schools grew from one to ten; from 1869 to 1884, from ten to twenty-one; from 1884 to 1890, from twenty-one to thirty-one; from 1890 to 1894, from thirty-one to forty-one; and from 1894 to 1900, from forty-one to fifty-seven. The decline in number of schools moved during the twenty years from 1901 to 1921 from fifty-seven to forty-five; from 1921 to 1933, from forty-five to thirty-nine; and has since 1933 remained constant.

The peak in enrollment and in graduates was not reached at the time when the largest number of schools was in operation. The peak in enrollment came prior to World War I and the peak in number of students came in 1919. As a result of the war, this peak was followed in 1920 by the smallest number of graduates from 1894 to 1944, a period of fifty years. The number of graduates dropped from 3,587 in 1919 to 906 in 1920.

The proprietary dental school has been eliminated. The other ups and downs revealed by the record have been due to wars, depressions and changing requirements. The highest enrollment since 1925 was 9,014 in 1943, and the highest number of graduates since 1928 was 2,470 in 1944. This increase in graduates was due to the accelerated plan of instruction operating during the war. The lowest enrollment since 1925 was 7,160 in 1933, the result of the depression beginning in 1929. The lowest number of graduates since 1930 was 1,568 in 1941. This decrease in graduates was due in part to the effects of the depression and in part to the increased requirements which went into effect in 1937. The normal curve of enrollment was clearly moving upward before Pearl Harbor and was not immediately influenced by the war. Thus a steady normal increase from 7,184 in 1937 to 9,014 in 1943 took place.

At different times in the last hundred years there were perhaps 100 different dental schools in operation. Some of the proprietary schools closed, some were taken over by universities and a small number, while remaining as detached, independent institutions, were reorganized on a non-stock, non-profit basis. The movement in recent years has been steadily toward the absorption of dental education by the universities. Under the influence of the Council on Dental Education, during the last five years, the following changes have been made: the Kansas City-Western Dental College has become an integral unit of the University of Kansas City; the Texas Dental College at Houston has become an integral unit of the University of Texas; the Atlanta-Southern Dental College has become an integral unit of Emory University; and the North Pacific College of

Oregon has become an integral unit of the University of Oregon.

At the present time, therefore, thirty-five of the thirty-nine dental schools in the United States are owned and conducted by universities. Twelve of the thirty-five are integral units in the state universities of California, Illinois, Indiana, Iowa, Maryland, Michigan, Minnesota, Nebraska, Ohio, Oregon, Tennessee and Texas. Twenty-three of the thirty-five university schools are similarly conducted by private universities as follows: Georgetown University, Howard University, Emory University, Loyola University (Chicago), Northwestern University, University of Louisville (largely publicly supported), Loyola University (New Orleans), Harvard University, Tufts College, University of Detroit, University of Kansas City, St. Louis University, Washington University, Creighton University, Columbia University, New York University, University of Buffalo, Western Reserve University, Temple University, University of Pennsylvania, University of Pittsburgh, Baylor University and Marquette University.

Thus, four of the thirty-nine dental schools in the United States still remain outside of the ownership, control and management of public and private universities. The School of Dentistry of the Medical College of Virginia at Richmond, a publicly supported institution, and the School of Dentistry of the Meharry Medical College at Nashville, a privately supported institution for Negro students, are both associated with medical schools and are conducted on the university level. The College of Dentistry at Los Angeles, a non-profit organization bearing the title of the University of Southern California, is not owned and controlled by the University, and is managed by a separate board of trustees. Steps are under way to integrate this College with the University. The one dental school remaining with no formal affiliation with either a medical school or a university is the School of Dentistry of the College of Physicians and Surgeons at San Francisco. The institution operating under the corporate title of the College of Physicians and Surgeons, which conducts the dental school on a non-profit basis, does not conduct a medical school. This school has neighborly relations with Stanford University, and it is commonly expected that it will ultimately become an integral unit of this privately conducted university.

In addition to these thirty-nine dental schools, it is anticipated that three additional state university schools will soon be established. The legislature of the state of Washington has authorized the University of Washington to establish a dental school at Seattle, and this school is now in the process of organization. It is understood also that legislation looking to the early establishment of state university dental schools in Alabama and in Florida is under way.

The Council on Dental Education announced the establishment of its list of accredited schools in June 1945.[1] Twenty-four schools were given approval and twelve were given provisional approval. Two additional schools have since been given provisional approval.

A gratifying advance both in length of predental study and in the quality of the scholarship of entering students has taken place in recent years. By common consent, the American Association of Dental Schools moved to the 2-4 plan in 1937[2] and the present Council on Dental Education, organized in 1938, fixed the 2-4 plan as its minimum requirements.[3] Before the war two schools were requiring a minimum of three years of liberal arts preparation for admission and will perhaps go back to that level under normal

1. J.A.D.A. 32:663-668, June 1, 1945.
2. Proceedings of the American Association of Dental Schools, 1935, p. 60.
3. Preliminary Statement, Council on Dental Education, J. D. Educ. 3:236-245, April 1939.

conditions. In addition to the annual statistical reports received from all of the schools, the Council on Dental Education from time to time examines the entrance credentials of the schools. These sources of information clearly indicate that all of the schools are faithfully enforcing the prescribed minimum admission requirements comprising the successful completion of two years of study in an approved liberal arts college, including one year of English, biology, physics and inorganic chemistry and one-half year of organic chemistry. Under the Council's requirements, biology or physics or both subjects may be waived by applicants with exceptionally high scholastic records who present evidence of three or more years of credit in liberal arts studies. The majority of the schools subscribe to this permissive regulation but do not employ it in large numbers of cases. The purpose of the Council in providing this exception, which has been endorsed in principle by the American Association of Dental Schools,[4] was to put needed premium and emphasis upon scholarship as the best evidence yet available of the ability of an applicant to carry the dental course successfully. More and more attention is being given by the schools to the relative scholastic standing of all applicants. More than half of the schools now require a "C" average and the other schools aim at that level.

It may be of interest to note the distribution by number and percentage of the academic quantitative level of entrance credentials offered by the 8,590 undergraduate students enrolled in the dental schools of the United States as of October 15, 1944, the date of the annual student inventory taken by the Council on Dental Education. Four thousand, one hundred and eighty-four students, or 48.7 per cent of the total number, were satisfied with the minimum prescribed admission requirement of two years of work in liberal arts; 1,956 or 22.8 per cent offered three years; 319 or 3.7 per cent offered four years without a degree; and 2,131 or 24.8 per cent offered a bachelor's or other degree. Thus, it appears that 51.3 per cent of all the students offered three or more years of liberal arts preparation. These records take no account of the considerable number on the two-year level who offered more than two years but less than three for admission.

This excellent showing is slightly below the level which was gradually being established before the war. The accelerated plan of instruction, instituted after Pearl Harbor, and the A.S.T.P. and V-12 programs of the Army and the Navy hastened the admission of some students. The trend which was begun before the war toward the offering of more than the minimum requirements for admission was clearly evident (Table 1).

The percentages of the total enrollment offering a bachelor's or other degree for admission for the years from 1940 to 1944, inclusive, ranged as follows: 1940, 28.5 per cent; 1941, 27.8 per cent; 1942, 27.1 per cent; 1943, 26.4 per cent; 1944, 24.8 per cent. The average for the five years was 26.9 per cent.

These figures for the total enrollment are closely confirmed by the records of the entering classes from 1940 to 1944, inclusive (Table 2). In that time, 12,541 new students were admitted to the dental schools of whom 6,164 or 49.2 per cent offered two years of academic preparation, 2,757 or 21.9 per cent offered three years, 576 or 4.6 per cent offered four years without a degree and 3,044 or 24.3 per cent offered a bachelor's or other degree.

In connection with the future choice of students, the Council on Dental Education and the American Association of Dental Schools are cooperating in the establishment of a series of mental and

4. Proceedings of the American Association of Dental Schools, 1944, p. 177.

Table 1.—The Academic Quantitative Level of the Entrance Credentials Held, in Number and Percentage, by the Total Undergraduate Enrollment in the Thirty-Nine Dental Schools in the United States as of October 15 in the Years 1940 to 1944, Inclusive

Year	Total Number	2 Years		3 Years		4 Yrs. Without Degree		Bachelor's or Other Degree	
		Number	%	Number	%	Number	%	Number	%
1940	7,720	3,957	51.3	1,338	17.3	223	2.9	2,202	28.5
1941	8,355	4,201	50.3	1,510	18.1	320	3.8	2,324	27.8
1942	8,847	4,341	49.1	1,740	19.7	366	4.1	2,400	27.1
1943	9,014	4,380	48.6	1,905	21.1	346	3.8	2,383	26.4
1944	8,590	4,184	48.7	1,956	22.8	319	3.7	2,131	24.8
Average per cent			49.6		19.8		3.7		26.9

Compiled from the Dental Students' Register, Council on Dental Education, 1940 to 1944.

Table 2.—The Academic Quantitative Level of the Entrance Credentials Held, in Number and Percentage, by the Total Freshman Classes in the Thirty-Nine Dental Schools of the United States as of October 15 in the Years 1940 to 1944, Inclusive

Year	Total Number	2 Years		3 Years		4 Yrs. Without Degree		Bachelor's or Other Degree	
		Number	%	Number	%	Number	%	Number	%
1940	2,305	1,201	52.1	421	18.3	64	2.8	619	26.8
1941	2,476	1,162	46.9	526	21.2	140	5.6	648	26.3
1942	2,702	1,236	45.7	675	25.0	127	4.7	664	24.6
1943	2,562	1,228	47.9	599	23.4	147	5.7	588	23.0
1944	2,496	1,337	53.6	536	21.4	98	4.0	525	21.0
Totals and average per cent	12,541	6,164	49.2	2,757	21.9	576	4.6	3,044	24.3

Compiled from the Dental Students' Register, Council on Dental Education, 1940 to 1944.

Table 3.—Distribution of Enrollment in the Dental School, Northwestern University, 1940 to 1944, Inclusive

Year	From Illinois	From Other States and Foreign Countries		Total Enrollment
	No. of Students	No. of Students	No. of States	
1940	102	193	41	295
1941	115	180	41	295
1942	137	180	39	317
1943	139	197	37	336
1944	99	167	36	266
Average for five years	118	183	39	302

Compiled from the Dental Students' Register, Council on Dental Education, 1940 to 1944.

manual aptitude tests for all entering students.[5] It is not expected, in the beginning at least, that the tests will be used as a condition of admission. They will be tried on an experimental basis and the results will be studied in connection with the individual student's records both in his predental education and in his dental studies. Effort will be made to discover the manual dexterity, the general intelligence and the personal fitness and adaptability of the applicant for dental study.

There is distinct cause for congratulation on the record and in the prospects for the future in the choice of students. The schools are keeping faith with themselves and with the Council on Dental Education. There is every reason to believe that the upward curve in enrollment and the improvement in both the quantitative and qualitative levels of the credentials offered for admission, clearly observable before the war, will be resumed when normal procedures are reestablished.

In other words, the gradual development of dental education on the university level and the choice of students able to meet the tests of university discipline go forward hand in hand. It is not too much to say, with this evidence of accomplishment, that dentistry is becoming a learned profession and is taking its deserved place beside medicine, law, engineering, architecture and other learned professions.

Part 2: Comparative Distribution of Dental Students, Practitioners and Population

However well qualified the students are at present and whatever improvements may be made in their future choice, the indisputable fact remains that the geographic distribution of the dental students as a whole does not augur well for the equitable distribution of dental care. All the studies of the Council on Dental Education indicate that dental students, by and large, tend to return upon graduation to the states and communities from which they came. The geographic home distribution of the dental students, therefore, determines in large measure the location of the practitioners of dentistry. Two records of experience may serve as evidence of the general disposition of dental graduates to return to their home environments to engage in practice. These records are taken from the enrollment in the Dental School of Northwestern University and from the enrollment of residents of the state of New York in dental schools outside of the state.

The Dental School of Northwestern University, for many years, has regularly received students from nearly every state in the Union. It is the one dental school in the country with a student body representative of the entire nation. The records as of October 15 for the years 1940 to 1944, inclusive, may be used by way of illustration (Table 3). The average enrollment of residents of Illinois for the five-year period was 118, the average enrollment from other states and foreign countries was 183 and the average number of states from which students came from outside of Illinois was thirty-nine. This is evidence enough of the preponderant nationally representative character of the student body.

The distribution of the licensing examinations taken by the graduates of Northwestern before state boards for the years 1939 to 1943 shows where these students go to engage in practice (Table 4). The average number of applicants for the five-year period examined in Illinois was forty-five, the average number examined in other states was seventy-eight and the average number of states, outside of Illinois, to which the graduates returned to take licensing exam-

5. J.A.D.A. 32:752-756, June 1, 1945, and J.Am.A.D. Schools 9:220-222, April 1945.

Table 4. — Distribution of Licensing Examinations Taken by Graduates of the Dental School, Northwestern University, 1939 to 1943, Inclusive

Year	Examined in Illinois	Examined in Other States		Total Examined
		Number of Applicants	Number of States	
1939	48	80	31	128
1940	43	71	27	111
1941	46	83	36	129
1942	33	75	31	108
1943	54	81	31	135
Average for five years	45	78	31	122

Compiled from the statistical records of the Council on Dental Education.

Table 5.—The Enrollment of Residents of New York State in Dental Schools in the State and in Other States as of October 15 for the Years 1940 to 1944, Inclusive

Year	No. Enrolled in Three Schools in New York State	Enrollment in Other Schools		Total Enrollment of All New York Residents
		No. Enrolled	No. of Schools	
1940	847	957	33	1,804
1941	831	988	33	1,819
1942	846	1,005	35	1,851
1943	824	976	32	1,800
1944	771	871	34	1,642
Average for five years	824	959	33	1,783

Compiled from the Dental Students' Register, Council on Dental Education, 1940 to 1944.

Table 6.—The Record of Licensing Examinations of Residents of the State of New York Taken by Graduates of the Three Dental Schools in New York State and by Graduates of Schools in Other States for the Years 1939 to 1943, Inclusive

Year	Number Examined from Three Schools in New York State	No. Examined from Other Schools		Total Examined
		No. Examined	No. of Schools	
1939	223	252	16	475
1940	233	214	19	447
1941	219	293	21	512
1942	220	269	18	489
1943	220	288	21	508
Average for five years	223	263	19	486

Compiled from the statistical records of the Council on Dental Education.

inations was thirty-one. The records of both enrollment and licensing examinations follow parallel lines and clearly indicate that the great majority of Northwestern graduates who enroll from the various parts of the country go back to their home regions to practice. Indeed, Dean Freeman of the Dental School of Northwestern University has reported that at the twenty-fifth reunion of his own class, it was found that 60 per cent of the surviving members were practicing dentistry in the home towns from which they originally registered as students.

The enrollment of residents of New York State, as of October 15, in dental schools in the state and in other states for the years 1939 to 1943, inclusive, leads to the same conclusion (Table 5). For each of these years there were more residents of the state studying dentistry in schools in other states than in the home state of New York. The average enrollment of New York residents in the three schools within the state for the five-year period was 824, the average enrollment in schools outside the state was 959 and the average number of outside dental schools in which the New Yorkers were enrolled was thirty-three.

The record of licensing examinations taken by residents of the State of New York before the New York State Board of Dental Examiners from 1939 to 1943, inclusive, parallels the records of enrollment (Table 6). The average number of graduates of the three New York State dental schools for the five-year period was 223, the average number of graduates of other schools outside of the state was 263 and the average number of these schools represented was nineteen. It seems clear that New York State depends more heavily for its annual supply of new entrants to the dental profession upon schools in other states than upon the schools within its borders. The record clearly indicates that the great majority of the residents of the state who study dentistry in schools outside of the state return home to take the licensing examinations and to engage in practice.

If these illustrations, drawn from the experience of graduates of the Dental School of Northwestern University and from the records of licensing examinations taken by residents of New York State, may be accepted as representing the tendencies of dental graduates to engage in practice in their home environments, the conclusion is inescapable that the equitable distribution of dentists to meet the dental needs of the American people depends upon the geographic distribution of dental students. The imbalance in the present enrollment in the dental schools points inevitably to a like imbalance in the provisions for national dental care.

The enrollment in all the dental schools in the United States, as of October 15, for the years 1940 to 1944, inclusive, still further confirms this view. The average enrollment for the five-year period for all the states and the District of Columbia was 8,319. Five states furnished 45 per cent of the total average enrollment as follows: New York, 1,783 or 21.43 per cent; Illinois, 566 or 6.80 per cent; California, 535 or 6.43 per cent; Pennsylvania, 473 or 5.68 per cent; Ohio, 385 or 4.63 per cent. All the other states, therefore, furnished 55 per cent of the average enrollment in the dental schools for this five-year period.

It will be of interest now to note the number of licenses issued on examination by the states and the District of Columbia for the five-year period from 1939 to 1943, inclusive. It appears that the five states above mentioned issued in this five-year period an annual average of 43.50 per cent of the total of such licenses issued in the nation as follows: New York, 441 or 18.68 per cent; Illinois, 144 or 6.10 per cent; California, 180 or 7.62 per cent; Pennsylvania, 179 or 7.50 per

Table 7.—The Average Enrollment and the Average Percentage of Enrollment in Dental Schools of Residents of New York, Illinois, California, Pennsylvania and Ohio for the Years 1940 to 1944 and the Average Number and Percentage of Licenses Issued on Examination by the Boards of These States for the Years 1939 to 1943

State	Average Enrollment	Average Per Cent of Enrollment	Average Licenses Issued	Average Per Cent of Licenses Issued	Per Cent of Total Population 1940
New York	1,783	21.43	441	18.68	10.23
Illinois	566	6.80	144	6.10	6.00
California	535	6.43	180	7.62	5.24
Pennsylvania	473	5.68	179	7.50	7.51
Ohio	385	4.63	85	3.60	5.24
Total	3,742	44.97	1,029	43.50	34.22
All other states	4,577	55.03	1,332	56.50	65.78

Compiled from the Dental Students' Register and other records of the Council on Dental Education.

cent; Ohio, 85 or 3.60 per cent. All the other states, therefore, issued on the annual average 56.50 per cent of all the licenses. When the average annual enrollments in these five states from 1940 to 1944, inclusive, and the average annual licenses issued on examination from 1939 to 1943, inclusive, are set down side by side, the correlation is striking (Table 7). The parallels between the two sets of figures still further confirm representations already made concerning the tendency of dental graduates to return home to practice. It is not to be understood in this connection that the states of New York, Illinois, California, Ohio and Pennsylvania enroll more dental students in the dental schools of the United States than they need upon graduation to meet the demands of their people for dental care. Rather, it appears that the remainder of the states, taken as a whole, with individual exceptions, do not send enough students to the dental schools to meet the dental needs of their people.

One other consideration relating to the geographic imbalance in the enrollment of dental students must be presented. It has to do with the marked disproportion of enrollment on the basis of population between the large cities and the other areas in the individual states. Complete statistics are not available but enough evidence is at hand to show the general situation conclusively.

A study made by Gerald S. Timmons, Dean of the College of Dentistry, Temple University, of the enrollment by counties of Pennsylvania students in the three dental schools in the state as of January 20, 1945, presents a situation believed to be typical of the enrollment of the residents of other states. At the time of his investigation, Dr. Timmons found that there were 403 Pennsylvania residents enrolled in the three schools, of whom 226 or 56.08 per cent came from Allegheny and Philadelphia counties, the metropolitan areas of Pittsburgh and Philadelphia. These two counties have 23.77 per cent of the population of Pennsylvania and provide over one-half of the dental students. Nineteen of the sixty-seven counties in Pennsylvania have no dental students.

A similar situation exists in New York State.[6] As of October 15, 1944, there were 771 New York residents enrolled

6. Dental Students' Register, Council on Dental Education, 1944.

in the three dental schools within the state. The two schools in New York City, enrolling 633, drew their students very largely from the metropolitan area. Likewise, the school in Buffalo drew its 138 students mainly from Erie County, the Buffalo metropolitan area. Upstate New York, excluding the Buffalo area, provides a relatively small percentage of the New York State residents studying dentistry in and outside of the state.

The author made a study of the geographic distribution of the Illinois residents studying dentistry in the three dental schools within the state as of October 15, 1943.[7] At that time there were 547 residents of Illinois enrolled in the three schools of whom 432 or 79 per cent came from Cook County, the Chicago metropolitan area, and 115 or 21 per cent came from fifty-three of the 101 other counties in the state. The University of Illinois enrolled 175 residents, 132 from Cook County and forty-three from twenty-eight other counties; Northwestern University enrolled 139 residents, 100 from Cook County and thirty-nine from twenty-six other counties; Loyola University enrolled 233 residents, 200 from Cook County and thirty-three from twenty-one other counties. Thus, Cook County, with 51 per cent of the population of the state, had 79 per cent of the dental students, and the remainder of the state, with 49 per cent of the population, had 21 per cent of the students. Forty-eight of the 102 counties had no dental students.

All of these considerations of the geographic imbalance in the recruiting of dental students from the several states are confirmed by figures which show the percentage of the total population in 1940 of each state, the number and the percentage of the total number of dental students from each state as of October 15, 1943, and the population per dental student in each state (Table 8). The range is from a population of 5,558 to one dental student in Utah to a population of 44,318 to one dental student in New Mexico. The first sixteen states with the most favorable ratios of population to dental students show a higher percentage of the total number of dental students than of the total population, one state shows identical percentages and thirty-two states show a higher percentage of population than of dental students.

Part 3: Evaluation of Immediate Need for Enlarged Dental Training Program

The uneven distribution of dental students from the several states leads to a consideration of the distribution of the dentists of the United States on the basis of population distribution. How far has the output of the schools over the years kept pace with the dental needs of the American people as a whole and in the different areas of the country? Fortunately, data are available showing the population for each decade from 1840 to 1940, the number of dentists and the population per dentist (Table 9). The increase in population and in number of dentists and the corresponding decrease in the population per dentist were comparable until 1930. The population increased from 17,069,453 in 1840 to 122,775,046 in 1930. The number of dentists increased from 1,200 in 1840 to 71,055 in 1930. The ratio of the population to dentists decreased from 14,224 persons to one dentist in 1840 to 1,728 persons to one dentist in 1930. While the increase in dentists from decade to decade did not quite keep pace with the growth of the population, it nevertheless was in close conformity to it.

A marked change seems to have taken place in the decade from 1930 to 1940. The population increased from 122,775,046 to 131,669,275. The number of dentists decreased from 71,055 to 70,601. The ratio of population to dentists in-

7. Provisions for Dental Education in Illinois. Manuscript.

Table 8.—The Percentage of Each State in the Total Population of the United States, the Number and Percentage of Dental Students from Each State as of October 15, 1943, and the Population Per Dental Student from Each State

State	Per Cent of Total Population	Number of Dental Students	Per Cent of Dental Students	Population Per Dental Student
Utah	.41	99	1.12	5,558
New York	10.23	1,800	20.38	7,488
Rhode Island	.54	83	.94	8,594
Oregon	.82	121	1.37	9,005
Connecticut	1.29	176	1.99	9,768
Idaho	.39	54	.61	9,923
District of Columbia	.50	66	.75	10,047
Minnesota	2.12	266	3.01	10,497
New Jersey	3.15	370	4.19	11,243
Illinois	6.00	641	7.25	12,320
California	5.24	552	6.24	12,513
Wisconsin	2.38	239	2.70	13,128
Nebraska	.99	98	1.11	13,386
Massachusetts	3.27	322	3.64	13,406
Nevada	.08	8	.09	13,780
Montana	.42	38	.43	14,722
Michigan	3.99	340	3.85	15,459
Washington	1.31	116	1.31	15,829
New Hampshire	.37	31	.35	15,855
Colorado	.85	69	.78	16,279
Iowa	1.92	154	1.74	16,482
North Dakota	.49	38	.43	16,894
Arizona	.38	29	.33	17,216
West Virginia	1.44	109	1.23	17,449
Florida	1.44	107	1.21	17,733
Delaware	.20	15	.17	17,767
Ohio	5.24	386	4.37	17,895
Texas	4.89	359	4.07	17,896
Indiana	2.60	184	2.08	18,629
Louisiana	1.79	118	1.33	20,003
Oklahoma	1.76	116	1.31	20,141
Maine	.64	42	.47	20,172
Kansas	1.36	88	.99	20,466
Arkansas	1.48	50	.56	20,738
Vermont	.27	17	.19	21,131
Maryland	1.38	85	.96	21,426
North Carolina	2.70	166	1.88	21,516
Missouri	2.87	172	1.94	22,003
Wyoming	.19	11	.12	22,795
Pennsylvania	7.51	432	4.89	22,917
South Dakota	.49	28	.32	22,963
Virginia	2.03	99	1.12	27,048
Tennessee	2.21	107	1.21	27,250
Alabama	2.15	94	1.06	30,138
Georgia	2.37	103	1.16	30,327
Kentucky	2.16	93	1.05	30,598
South Carolina	1.44	61	.69	31,128
Mississippi	1.66	69	.78	31,645
New Mexico	.40	12	.13	44,318
UNITED STATES	100.00	8,833	100.00	14,906

Compiled from the Dental Students' Register and the 1940 census.

Table 9.—Population, Dentists and Ratio of Population to Dentists in the United States, 1840 to 1940

Year	Population	Number of Dentists	Population Per Dentist
1840	17,069,453	1,200	14,224
1850	23,191,876	2,923	7,934
1860	31,443,321	5,606	5,609
1870	39,818,449	7,988	4,985
1880	50,155,783	12,314	4,073
1890	62,947,714	17,498	3,597
1900	75,994,575	29,665	2,562
1910	91,972,266	39,997	2,299
1920	105,710,620	56,152	1,883
1930	122,775,046	71,055	1,728
1940	131,669,275	70,601	1,865

Compiled by Lon W. Morrey from "Comparative Occupation Statistics for the United States, 1870-1940," and other publications, U. S. Bureau of the Census, 1943. J.A.D.A. *32*:136, February 1, 1945.

creased from 1,728 persons to one dentist to 1,865 persons to one dentist. Thus, for the first time in one hundred years, the decade ending in 1940 shows a decrease in the number of dentists and a failure to maintain the ratio of dentists to population.

Considering the recent estimate of the Bureau of the Census that the population has increased from 131,669,275 in 1940 to 139,682,000 in 1945, or an advance of 6 per cent in the first half of the present decade, this situation calls for the closest scrutiny. No question is raised regarding the accuracy of the census reports. They furnish the only available basis for comparison over the years. The census figure of 70,601 dentists in 1940 is based on a tabulation of so-called "active" dentists and has been employed in recent studies by O'Rourke[8] and Morrey.[9]

Sufficient notice has not been given to the comprehensive study made from 1940 to 1942 by the Committee on Economics of the American Dental Association of the number and distribution of dentists. This study employed the 1940 census as a population basis and secured from the District of Columbia and from all but five of the states, largely through the cooperation of state dental societies and other state agencies, complete lists of dentists by counties and municipalities. It was necessary in compiling the total figures to employ the census records of the number of dentists in Illinois, Minnesota, South Carolina, Washington and West Virginia since detailed records of the number of dentists by counties and municipalities were not available in these states when the study was made. In all other states, however, the records are duly verified by state agencies.[10]

No exact date was fixed for the findings since the reports from the states were received over a period of two years. Based on the 1940 census and on these special returns, this study accounts for 75,685 dentists and a population of 1,740 persons to one dentist. Even this more favorable figure as compared with that of 70,601 reported by the census leaves the ratio of population to dentists at

8. O'Rourke, J. T.: An Analysis of the Personnel Resources of the Dental Profession. J.A.D.A. 30:997-1006, July 1, 1943, and An Analysis of the Number and Distribution of Active Dentists in the United States, 31:1097-1110, August 1, 1944.

9. Morrey, Lon W.: Dental Personnel. J.A.D.A. 32:131-144, February 1, 1945.

10. Distribution of Dentists in the United States. Committee on Economics, American Dental Association.

1,740, higher than it was in 1930. In other words, by either set of figures, the decade from 1930 to 1940 shows the first decline of the ratio of dentists to population in one hundred years.

This paper will employ the figures compiled by the Committee on Economics in further considerations. It appears that the declining supply of dentists as compared with the population is distributed over the country as a whole and between urban and rural areas with an even greater degree of imbalance than was found in the case of dental students.

The population of each state in 1940, the percentage of the entire population of each state, the number of dentists in each state as reported to the Committee on Economics, the percentage of the entire number of dentists in each state and population per dentist in each state, are of interest. The District of Columbia with 1,017 persons to each dentist has the most favorable ratio. California, Iowa and New York come next with 1,145, 1,175 and 1,256 persons, respectively, to each dentist. The range is from 1,017 in the District of Columbia to 5,870 in Mississippi. The District of Columbia, California, Iowa, New York, Oregon, Illinois, Minnesota, Massachusetts, Wisconsin, Connecticut, Nebraska, Washington, New Jersey, Missouri, Pennsylvania, Colorado, Rhode Island and Ohio have a higher percentage of the total number of dentists than of the population. All the other states have a lower percentage.

The geographic imbalance in the distribution of dentists is influenced to a marked degree by the lack of adequate provision for the dental care of Negroes and other nonwhite races. Six states, Maine, Nevada, New Hampshire, North Dakota, South Dakota and Vermont, have no nonwhite dentists. The range of nonwhite population per nonwhite dentist is from 1,907 in Massachusetts and 1,990 in Connecticut to 37,154 in Mississippi and 39,506 in New Mexico. There are 12,865,518 Negroes in the United States and 1,471 Negro dentists or 8,746 persons to one dentist.

A special study of the number and distribution of dentists between cities with a population of over 15,000 and all other areas reveals some striking situations (Table 10). Unfortunately, the cities of Illinois, Minnesota, South Carolina, Washington and West Virginia, from which detailed data are not available, are not included in these tables. There are 617 cities, adding Washington, D. C., with a population over 15,-

Table 10.—Summary of Population and Dentists by Cities over 15,000 and Other Areas in Forty-Three States

Cities	No.	Population	Per Cent of Total Population	No. of Dentists	Per Cent of Total Dentists	Population Per Dentist
Over half million	12	18,968,017	16.4	19,250	29.4	985
Between 250,000 and 500,000	20	6,679,106	5.8	6,205	9.5	1,076
Between 100,000 and 250,000	51	7,354,779	6.4	5,784	8.8	1,271
Between 15,000 and 100,000	534	17,419,647	15.0	13,639	20.8	1,277
All cities over 15,000	617	50,421,049	43.6	44,878	68.5	1,123
All other areas	.....	65,020,716	56.4	20,583	31.5	3,159
Forty-three states	.....	115,441,765	100.0	65,461	100.0	1,763

Compiled by the author from "Distribution of Dentists in the United States" by the Committee on Economics of the American Dental Association.

000, with a combined population of 50,421,049 or 43.6 per cent of the entire population in the area under consideration. They have 44,878 dentists or 68.5 per cent of the total number of dentists in this area, and a combined population of 1,123 per dentist.

The combined population of forty-three states excluding the cities over 15,000 is 65,020,716 or 56.4 per cent of the whole area. The number of dentists is 20,583 or 31.5 per cent of the total number of dentists, and the population per dentist is 3,159. It appears, with very few exceptions, that the combined cities in these states are provided with dentists from two to five times as well as are the other regions. Iowa and Massachusetts are the only states which approach a balance in the supply of dentists between cities over 15,000 population and rural areas. Thus Iowa has 1,007 persons per dentist in her sixteen cities and 1,253 persons per dentist in the remainder of the state. Massachusetts has 1,270 persons per dentist in her fifty-seven cities and 1,816 per dentist in the remainder of the state. On the other hand, New York State with 1,087 persons per dentist in her fifty-two cities has 2,516 persons per dentist in the remainder of the state, and at the other end of the scale Arkansas has 1,424 persons to one dentist in her six cities and 6,925 persons to one dentist in the remainder of the state. Mississippi has 2,191 persons to one dentist in her nine cities and 7,306 persons to one dentist in the remainder of the state.

It should be pointed out in this connection that no figures are available showing the number of people who live outside of the cities over 15,000 population and go into those cities for dental care. The number may be considerable in some regions, but, broadly, the situation remains as here described. While data for all the cities of Illinois and Minnesota are not at hand, the figures for the metropolitan areas in these two states are available. According to the latest figures,[11] Cook County, which is the metropolitan area of Chicago, has 51 per cent of the population of the state of Illinois, 70 per cent of the dentists and 855 persons to one dentist. The remainder of the state, including all other cities, has 49 per cent of the population, 30 per cent of the dentists and 1,824 persons to one dentist. The metropolitan area of Minneapolis and St. Paul, comprising four counties, has 35 per cent of the population of the state of Minnesota, 47 per cent of the dentists and 902 persons per dentist. The remainder of the state, including all other cities, has 65 per cent of the population, 53 per cent of the dentists and 1,516 persons to one dentist.

One other illustration of the wide variation in the provision for dental care is based on the population and number of dentists by counties in all of the states except South Carolina, Washington and West Virginia, for which such figures are not available. There are 2,935 counties in the other forty-five states. Two hundred and fifteen counties with a total population of 1,213,366 have no dentists. These counties are distributed as follows: 137 in Southern states with a population of 985,019; and seventy-five in Northern states with a population of 232,267. One hundred and forty-nine counties have a population of 10,000 to 55,000 to one dentist; 497 counties have a population of 5,000 to 10,000 to one dentist; 1,302 counties have a population of 2,000 to 5,000 per dentist; 743 counties have a population between 1,000 and 2,000 per dentist; and twenty-eight counties have less than 1,000 per dentist. These data should be evidence enough of the geographic imbalance of the provisions for dental care in the United States at the present time.

11. Distribution of Dentists in the United States. Committee on Economics, American Dental Association.

Part 4: Summary

In the light of the facts which have been presented, it is time to ask and to attempt to answer the question: What of the future?

First, it seems safe to assume that the healthy situation existing in the length and quality of the preliminary education of dental students is likely to continue. There is every reason to believe that the development of guidance as an instrument of education, on both the high school and college levels, will aid the continuing search for qualified students and that the employment of aptitude tests of both mental ability and manual skill will be of invaluable assistance to recruiting officers in the future. At least, it can be said that, in this stage of the evolution of dental education, the schools and the profession are moving in what appears to be a safe and promising direction in the choice of dental students.

Second, it seems quite certain that there will be no backtracking in the organization and administration of dental schools. The movement toward the ownership, control and professional direction of dental schools by public and private universities has clearly come to stay. There is no prospect or danger of the reestablishment of proprietary dental schools; there are happily no short-cut sub-standard schools in existence, and it seems very unlikely that any new school will be instituted without university affiliation. It is, to be sure, one thing for a dental school to be physically possessed and materially managed by a university; it is quite another thing for a dental school, even as an integral unit in a university, to take on all the habiliments and atmosphere of university procedure and to meet the exacting tests of university discipline. It can be said confidently that the fortunate trend is toward the complete functioning of dental education on the university level. One of the handicaps to this end, for which there is no place for discussion in this paper, is the lack of adequate financial support in many dental schools. It is clear that dental education cannot everywhere be developed on a true university level without income beyond the ordinary receipts from tuition, fees and clinics.

Too many dental schools, with the highest of ideals and the best of purposes, are trying to lift themselves by their bootstraps. There are growing signs that society will come more strongly to the support of the dental education of the future. Meanwhile, the profession is fortunate in having the professional education of its members in university hands and in possessing the certainty of complete university functioning in due time. This situation is also healthy and promising.

Third, the geographic imbalance in the sources from which dental students are drawn, however well qualified and fitted they may be for dental study and practice, is a matter of grave concern at a time when various agencies are considering the possibility of the extension of adequate dental care to all of the people. The evidence seems clear that we shall not make much progress toward a more even distribution of the dental care we are able to afford our people until we draw students more evenly from all quarters of the country.

The trend at present is toward more students from the larger cities and more heavily populated areas and thus inevitably more dentists for these areas; and conversely, toward fewer students from the rural areas and smaller towns, villages and cities and thus inevitably fewer dentists for these regions.

The problem is not one which can be solved overnight. In the light of the clearly anticipated dental demands of the American people which will come in the wake of the war, it can hardly be said that any area is overpopulated with

dentists. It is not, therefore, that fewer dental students should be recruited from the large cities and the densely populated states; it is rather that more young people from the outlying regions should be interested in the possibility of careers in dentistry.

As matters now stand, few dental schools have seen the necessity and wisdom of intelligent and legitimate canvassing of their own natural territories for qualified student material. There is hardly a dental school in the United States which is not within easy reach of acceptable liberal arts colleges which rarely, if ever, send a student to a dental school. The schools have been mainly content, thus far, to sit and wait for qualified students to appear. The profession can aid by unlearning the fatuous lesson that happiness, contentment, professional advancement and the durable satisfactions of life are to be found only in the large cities. There are thousands of communities in America where a qualified dentist could make a comfortable living and build a satisfactory career for himself. The choice of dental students upon equitable geographic grounds, more nearly in accord with the dental needs of all the people, is one of the major problems before dental education and before the profession of dentistry.

Fourth, the problem of the equitable distribution of the existing supply of dentists between state and state, between city and country and between white and nonwhite people goes far beyond the geographic imbalance in the recruiting of dental students. When the population per dentist varies in the states from 1,145 to 5,870, when 617 cities in forty-three states have 43.6 per cent of the population in those states and 68.5 per cent of the dentists, when 215 counties in the nation have no dentists and 149 counties have a population of from 10,000 to 55,000 per dentist, it is obvious that the present distribution of dentists will never bring adequate dental care to all the people.

It is difficult, therefore, to escape the conviction that we must have a larger annual supply of new dentists for the years immediately ahead.

This paper has purposely taken no note of the wartime conditions. In time, the 20,000 or more dentists in the armed forces will be mainly returning to civilian life. The loss by death in the service has not been disproportionate to the loss in private life. How many dentists are required under normal conditions to meet the needs and demands of the American people? It must be borne in mind that the needs will continue, as has been the situation in the past, to be far greater than the demands. Not all persons who need dental care and can afford it, seek it and even millions who need it are not able to pay for it. Nobody knows how many dentists would be required if our entire population should regularly have the dental care it needs. Under present conditions of practice, it has been estimated that the average dentist treats about 400 patients in a year.[12] Eliminating all of the population under 2 years of age, it would still require, on the basis of 400 patients a year, something like 350,000 dentists to provide adequate and continued dental care for all of the people. This figure is astronomical and merely serves to indicate how widely our people yet go without dental care. In a word, all signs indicate that the supply of dentists is not at present adequate to meet the current demands of the people, to say nothing of their dental needs.

According to the figures compiled by the Committee on Economics, there was a population of 1,740 to one dentist in 1941. The Bureau of the Census has

12. Leven, Maurice: Practice of Dentistry and Income of Dentists in Twenty States. University of Chicago Press, 1929, p. 55.

Table 11.—Dentists, Graduates and Population Per Dentist, 1941-1950

Year	Number of Dentists	Loss by Death and Retirement	Increase by Graduates	Loss or Gain	Net for Year	Population Per Dentist
1941	75,685	1,815	1,568	247—	75,438	1,740
1942	75,438	1,809	1,784	25—	75,413	.....
1943	75,413	1,809	1,926	117+	75,530	.....
1944	75,530	1,812	2,470	657+	76,188	.....
1945	76,188	1,828	3,200	1,385+	77,573	1,801
1946	77,573	1,861	Est. 2,000	139+	77,712	.....
1947	77,712	1,865	Est. 2,000	135+	77,847	.....
1948	77,847	1,868	Est. 1,000	868—	76,979	.....
1949	76,979	1,847	Est. 1,500	347—	76,630	.....
1950	76,632	1,838	Est. 1,800	38—	76,594	1,933

Compiled from the records of the Council on Dental Education and estimated by the author.

announced its estimate of the population in 1945 to be 139,682,000, a growth of 7,982,725 or 6 per cent in five years. Assuming peacetime conditions, this would now mean 1,801 persons to one dentist in place of 1,740 in 1941. If the population should increase in the next five years at the same ratio, it would reach 148,000,000 in 1950. This would then give us a population of 1,973 persons to one dentist against 1,740 in 1940. This would mean a progressive decline in the provisions for dental care, as compared with the population, over a period of two decades (Table 11).

In the face of these figures, and assuming a possible equitable distribution of dentists geographically, it seems clear that the output of the schools should be increased. Much depends for the next year or two on the drafting of young men for the armed forces and on the release of possibly qualified students now in the armed forces. It seems likely, even with the three new schools in prospect, that the normal output of graduates prevailing before the war will not be resumed for two or three years. It is doubtful whether all schools operating at full capacity in 1950 will be able to accommodate more than 12,000 students. This would mean roughly 2,500 graduates per year. On this basis with a loss of 24 per 1,000 annually by death and retirement,[13] we shall have a population in 1950 of 1,933 persons to one dentist as against 1,740 in 1941 and 1,801 in 1945. The demographers tell us that our population will increase for the next twenty-five years. These figures are speculative and subject to unforeseen conditions. If, however, we should have 2,500 graduates each year from 1950 to 1960 and if the population should increase at the current rate of 6 per cent in five years, we should have about 82,500 dentists in 1960 and a population per dentist of over 2,000. Thus it would appear that our population per dentist for the three decades from 1930 to 1960 will show a progressive increase and the provision for dental care will be less in 1960 than it was in 1930. This general situation will prevail even if the population does not increase as rapidly in the next decade as it apparently will in this decade. This basic issue confronts both society and the dental profession today.—*222 East Superior Street.*

13. O'Rourke, J. T., and Miner, L. M. S.: Dental Education in the United States. Philadelphia: W. B. Saunders Co., 1941, pp. 314-317.

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APTITUDE TESTING PROGRAM FOR DENTISTRY

An acute postwar problem is to be found in the necessity of reconciling the number of prospective students with the physical capacities of educational institutions. Dentistry, which has long suffered from a shortage of personnel and from an inadequate number of candidates from which to select the best qualified students, also finds itself with more prospective students than can be trained under present facilities. Whether this embarrassment of riches presents a temporary and natural aftermath of the war or whether it represents a permanent increase in the national level of educational endeavor as was the case after World War I, is still a question under discussion. Whatever the eventual finding, however, it is clear that dental schools have a definite need for better objective evidence by which to select students and to predict their success after entering. This evidence can be secured through the administration of aptitude tests to dental students before and during their professional courses.

Aptitude tests, already being applied in medicine and engineering, will be useful in dentistry to provide the basis for a study of the relations between informational skills, the ability to apply principles, manual dexterity, personality traits and interests. They will also throw considerable light upon the reasons why some students have difficulty with certain parts of their work in dental schools. Aptitude tests will show how dentistry can better adapt its training program to students already enrolled and they will also aid in the selection of those students who can profit most from the educational discipline in dentistry.

The Council on Dental Education of the American Dental Association and the American Association of Dental Schools have jointly been studying the problems of aptitude testing for the past two years. Their findings indicate that aptitude tests will be useful not only to provide data for the study of curriculums and instructional methods, but also to secure a better understanding of the relative strengths and weaknesses of individual students so that each can be given the most efficient assistance.

The Board of Trustees of the American Dental Association has endorsed this pro-

gram of aptitude testing and, on April 13, appropriated sufficient funds to the Council on Dental Education to inaugurate the program with the opening of the dental schools this fall. The joint committee will continue its promotion of the program, which will be inaugurated under the general supervision of the secretary of the Council on Dental Education, Harlan H. Horner.

Shailer A. Peterson, Ph.D., assistant professor of education at the University of Chicago and research consultant to the U. S. Department of Agriculture, will assume the full-time position of director of educational measurements on July 1. Under his direction a system of student personnel records will be set up by the Council on Dental Education in the Central Office. These records will be used to (1) provide a better evaluation of predental requirements; (2) compile statistics, including annual student registers; and (3) undertake a continuing study of students as they enter graduate training, internships and the practicing profession. The aptitude tests will not be used at the outset as a condition of admission to dental schools but will be used to provide basic data for a five-year study of the question, "Who shall study dentistry?"

Dentists who have been concerned with the shortage of personnel in their profession will do well to keep themselves informed on the progress of this program. The practicing dentist frequently comes into contact with young men and women who could become competent dentists. The aptitude testing program will reveal what factors are important in the selection of good dental students and will also enable the prospective student to analyze his own abilities, interests and training in the light of the special skills that this program will show to be important in dentistry.

THE ARTIFICIAL SILVER SHORTAGE

During the war, the United States Treasury Department was permitted to sell silver for industrial uses at 71.11 cents an ounce from governmental stocks which had already reached the tremendous total of 98,800 short tons in 1942. This practice, which allowed a relatively free flow of silver into industrial channels, was stopped at the end of 1945. Legislation to permit again the sale of silver for industrial purposes was then introduced by the so-called "silver bloc" in Congress. This legislation stipulated that industrial silver would be available at 90 cents an ounce provided (1) that the Treasury Department purchased the metal from producers at that price and (2) that the general price of silver would be raised to $1.29 an ounce in two years.

One of the effects of this proposal was to create an artificial shortage of industrial silver because none was available from the Treasury Department and because producers would not sell their stocks currently if a higher price could be expected in the immediate future. Another effect was to project a price increase of more than 25 per cent for industrial silver and of more than 80 per cent on the general cost of the metal. This artificial shortage is being sharply felt by industrial users and will lead directly to decreased production of such important items as film emulsions and dental alloys.

On June 8, the Senate Committee on Appropriations recommended that the price of industrial silver be increased to 90.3 cents an ounce and that the price of silver in the open market be raised to $1.29 an ounce by July 1, 1948. These provisions were attached to an important appropriation bill for the Treasury Department in order to insure their passage. The House of Representatives, however, it is known, has

refused to approve a price beyond 90 cents an ounce for silver and will attempt to secure the sale of industrial silver from governmental stocks at 71.11 cents an ounce.

Silver is used extensively in dentistry and in many essential industries for a wide variety of purposes. An artificial shortage creates great difficulties in providing certain types of dental service to the public. In addition, an unnecessary price rise imposes an unjustifiable addition to the cost of dental care. The American Dental Association, through the Committee on Legislation, has protested this artificial shortage and has urged Congress to reinstate the program which permits the release of industrial silver at 71.11 cents an ounce. Those dentists who wish to support this viewpoint are asked to communicate their views to their representatives in Congress.

GOALS IN DENTAL HEALTH

A general restatement[1] of goals in dental health for a five-year period has been made by the Council on Dental Health of the American Dental Association in response to a request[2] made by the Senate Committee on Education and Labor. This committee has been considering many legislative proposals to improve health but has concerned itself chiefly with the *methods* involved in a national health program. In this new effort the committee has asked 180 organized health groups to "join in a cooperative attempt to stake out specific health goals for the coming five years." This survey has been limited by the committee to a "discussion of goals and does not involve any questions as to alternate methods of achieving any specific goal."

Such an approach to the problem of improved national health has been long overdue. A clear statement of objectives is a basic necessity of planning if only to rule out some of the more impracticable notions that are always prevalent when *need* and *method* are discussed without direct relation to the ultimate goal. A summary of the goals fixed by the Council includes the following five points:

1. The prevention of dental diseases by discovering more effective methods of attacking the presently unknown causes of dental diseases; the support of such intensified research with adequate funds, personnel and facilities.

2. The control of dental diseases by the expansion of community dental programs, integrated in the general health program, to provide every child with dental care and dental health education, regardless of income or location. These programs should be maintenance programs centered on the control of the annual increment of new dental diseases in children.

3. The provision of additional facilities and uniform standards for dental care by making dental services available in hospitals and health centers for inpatients and outpatients.

4. The recruitment of an annual enrollment of dental students equal to the capacity of all dental schools in order to increase the number of qualified dentists.

5. The adoption of measures to make dental practice in smaller cities and rural areas more attractive and rewarding in order to procure a better distribution of dentists.

In the perspective of the Committee's request, the Council's statement shows again why the dental health problem cannot be solved effectively by merely tacking the

1. See page 899.
2. J.A.D.A. 33:568, February 15, 1946.

word "dental" to every prefabricated medical proposal that comes along. The nature and prevalence of dental diseases pose some special problems that cannot be solved by submerging dental programs in the large total of other unmet health needs. The fact that in 1941 only "0.6 per cent of the $109,000,000 budgeted from all sources for cooperative health work" was allotted to dental health activities is a distinct case in point.

The statement of the Council on Dental Health is important because it indicates once again the necessity of making some distinctions in the handling of dental diseases as a public health problem. It points as well to the essential need of earmarking funds for dental purposes. Until these things are done with specifically defined goals readily in view, the easy solution of endless emergency dental service as proposed by the current Wagner-Murray-Dingell bill will continue to receive much more attention than it deserves.

CABINET STATUS FOR THE HEALTH SERVICES

The recent reorganization of federal health and welfare agencies, announced May 16 by President Truman,[1] will become effective July 16 unless Congress takes adverse action before that date. When transmitting his reorganization message to Congress, the President said that he soon would ask Congress to make the present Federal Security Agency an executive department of government with a secretary as a member of the cabinet. As long ago as 1932,[2] the House of Delegates of the American Dental Association recommended "the establishment of a Federal Department of Health with a secretary who shall be a graduate in medicine, and a member of the President's cabinet; and a first assistant secretary (undersecretary) who shall be a graduate in dentistry."

It is to be hoped that Congress will consider this recommendation when and if it undertakes to establish a health and welfare agency as an executive department of the government.

1. J.A.D.A. 33:758, June 1, 1946.
2. Trans. A.D.A., p. 327. St. Louis, 1938.

NEWS OF DENTISTRY

Announce Local Committees For House of Delegates Meeting

Local committees for the annual House of Delegates meeting October 14, 15 and 16 in Miami have been announced by Harry B. Pinney, General Secretary of the American Dental Association. The list follows:

Local Arrangements: E. B. Penn, 901 Huntington Bldg., chairman, and E. C. Lunsford, 2742 Biscayne Blvd., vice-chairman.

Halls and Hotels: T. C. Henslee, 911 Huntington Bldg., chairman; J. A. Sansone, Curtis A. Haggard, H. I. Kendrick, Carl P. Arant and C. J. Ellison.

Reception: J. Murray Cox, 1210 Huntington Bldg., chairman; J. L. Armstrong, A. D. Farver, Roy T. Bovard, David L. Bosworth, Hill Gordon, H. K. Terry, Henry Renedo and W. F. Graves.

Publicity: H. L. Cartee, 810 Huntington Bldg., chairman; A. E. Rosenthal, Alfred Walker and W. W. Mitchell.

Banquet (President's Dinner): S. G. Alderman, 521 Dupont Bldg., chairman; William G. Sanchez, B. L. Wilkerson and Eugene V. Denault.

Information: C. W. Swords, 1001 Huntington Bldg., chairman; J. S. McKenzie, H. R. Turner, L. S. Turner, T. A. Price and R. S. Cherry.

Associated Groups: George M. Shields, 816-819 Congress Bldg., chairman; H. L. Cartee, J. Holden Beckwith, Jack Holden Beckwith, A. W. Kellner, L. D. Pankey, S. E. Misner, W. B. Hailey, A. F. Kasper, Z. N. Wright and I. W. Shields.

Women's Auxiliary: Mrs. J. Murray Cox, 620 N. E. 101st St., chairman.

A.D.A. Asks Government Release, Lower Prices on Silver Reserve

The American Dental Association last month urged Congress to authorize government sale of silver at 71.11 cents an ounce. Silver now is available only from non-government sources at considerably higher prices.

In a telegram to Sen. Kenneth McKellar, Tennessee, chairman of the Senate Committee on Appropriations, Carl O. Flagstad, chairman of the Committee on Legislation of the American Dental Association, urged Senate support of a House bill which would release a portion of the huge government silver reserve.

Pointing out the extensive use of silver in dentistry, Dr. Flagstad said, "It is in the interest of the public that an adequate supply of silver be available for health purposes at a price as low as possible."

(The Senate committee later recommended that the price of silver sold by the Treasury for domestic manufacturing uses be increased to 90.3 cents an ounce.)

Oklahoma Dental Association To Offer Dentistry Scholarship

The executive board of the Oklahoma State Dental Association has authorized a one-year tuition scholarship to a qualified Oklahoma high school graduate.

A three-member board, consisting of Fred Seids, Perry, chairman, Harry Sorrels, Oklahoma City, secretary, and Frank P. Bertram of the state department of public health, will select the scholarship student and place the plan in operation They will work with the Oklahoma Education Association.

The student selected must give evidence of good health, must have an intelligence quotient of at least 120 and a grade average of at least "B" in his high school work and must submit an essay on dental health as it relates to public health. He will also be given an aptitude test for dentistry, Dr. Sorrels said.

Selection will be made from high school graduates, but the student will be required to have had two years in predental work in an accredited college before the scholarship can be granted to him, Dr. Sorrels said.

New Jersey State Examiners Resurvey Approved Dental Schools

The State Board of Registration and Examination in Dentistry of New Jersey is conducting a resurvey of approved schools and will announce its new list of approved schools on or about January 1, 1947.

Some schools already have been added to the board's approved list as a result of findings of the Council on Dental Education of the American Dental Association, the board recently disclosed.

Graduates of the following dental schools, whose preliminary qualifications at the time of entrance into dental school met the requirements of the board, will be accepted as candidates for examination for licensure, according to an announcement from the board:

College of Dentistry, Howard University; College of Dentistry, University of Illinois; Harvard School of Dental Medicine; Tufts College Dental School; College of Dentistry, New York University; School of Dentistry, University of Buffalo; School of Dental and Oral Surgery, Columbia University; School of Dentistry, Western Reserve University; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; School of Dentistry, Meharry Medical College; College of Dentistry, Ohio State University; School of Dentistry, University of Michigan; Dental School, Temple University; Baltimore College of Dental Surgery, University of Maryland; School of Dentistry, University of Pittsburgh; School of Dentistry, University of Minnesota; Dental School, Marquette University; School of Dentistry, St. Louis University; School of Dentistry, Georgetown University; School of Dentistry, Washington University; School of Dentistry, Medical College of Virginia; College of Dentistry, University of California; Chicago College of Dental Surgery, Loyola University; Dental School, Northwestern University; Kansas City-Western Dental College, School of Dentistry, University of Kansas City; College of Dentistry, University of Nebraska; College of Dentistry, University of Tennessee; School of Dentistry, University of Louisville; and College of Dentistry, State University of Iowa.

"In view of the announced change in relationship of the dental school with the University and Medical School, this board has not approved Columbia University, School of Dental and Oral Surgery, as reorganized," the announcement said.

"Therefore, beginning July 1, 1946, the dental school of Columbia University will not appear on the approved list of schools of this board. However, students who have entered into the junior year before July 1, 1946, will be accepted as candidates for examination by the board upon graduation from Columbia."

It also was pointed out that the Harvard School of Dental Medicine has not been surveyed, but will be considered before announcement of the new list.

Seek Two American Dentists for Government Posts in Afghanistan

The Afghan Ministry of Public Health has appealed to the American legation at Kabul for aid in obtaining two dentists—a man and a woman—to teach, inspect local hospitals and provide professional service for Afghan officials.

In a recent dispatch to the State Department in Washington, the legation reported that the Afghan government is keenly interested in obtaining dentists from the United States because of a growing appreciation of American professional skill and methods and the perfection of American-made dental equipment.

According to the dispatch, a copy of which has been forwarded to the American Dental Association, the male dentist would be expected to teach at the

medical school, whose student body is entirely male, and to make periodic visits to the two hospitals for men. The woman would teach at the school for girls and visit the women's hospital.

Each would have an office, with dental equipment provided by the government, where professional services would be available for Afghan officials and others, among whom, the dispatch said, probably would be included members of the diplomatic corps and their staffs. The services of both dentists undoubtedly would be availed of by the Royal Family and high-ranking government officials and their families, the dispatch said. Neither dentist would be permitted to engage in private practice, and fees for services to officials would be collected for government account.

The American legation has made no attempt to learn the salaries the Afghan government would be prepared to pay, but the Ministry of Foreign Affairs has requested an indication as to the salaries that qualified candidates might expect. The legation indicated, however, that the Afghan government probably would not hesitate to meet the salary requirements of a qualified male dentist just returned from army or navy practice, who was not independently engaged in private practice before entering the service and who has no considerable investment in dental equipment.

In the case of a woman dentist, the legation indicated that, because of the obviously greater difficulty in obtaining a woman interested in going to Afghanistan and the corresponding importance of the position to the ministry, the Afghan government would be disposed to pay a good salary to a well-qualified applicant.

Applications can be sent to Daniel F. Lynch, chairman of the International Relations Committee of the American Dental Association, 1678 Primrose Road, N.W., Washington 12.

Committee Announces Procedure In Applying for A.D.A. Secretary Post

The special committee of the Board of Trustees of the American Dental Association appointed recently to receive applications for the position of General Secretary has issued the following statement through its chairman, LeRoy M. Ennis:

The constitution of the American Dental Association requires that the Board of Trustees nominate to the House of Delegates an applicant for the position of Secretary of the American Dental Association. As the General Secretary of the American Dental Association will not be a candidate for the office at his own request, the Board of Trustees has appointed the undersigned committee to receive applications and suggestions. The qualifications, experience and name of a candidate should be sent in quadruplicate to the chairman of the committee, LeRoy M. Ennis, 4001 Spruce St., Philadelphia 4.

Further information regarding the position of General Secretary may be obtained from any member of the committee: Howard E. Summers, First National Bank Bldg., Huntington, W. Va.; Henry Hicks, 5 Glen Court, Greenwich, Conn.; Russell A. Sand, 807 North Broadway, Fargo, N. Dak.; LeRoy M. Ennis, 4001 Spruce St., Philadelphia 4.

Appeal to U. S. Dentists To Furnish Books, Magazines for War-Torn Lands

The American Book Center for War Devastated Libraries, Inc., has appealed to the American Dental Association for aid in obtaining books and periodicals for shipment to Europe and the Orient.

Among most urgently needed publications are scholarly books which are important contributions in their fields, periodicals of significance and books dealing with the sciences and technologies.

Contributions should be sent prepaid via cheapest means of transportation to the American Book Center, c/o Library of Congress, Washington 25.

Army Praises Civilian Dentists For Work at Induction Centers

In appreciation of services rendered by civilian dentists and physicians at army induction and personnel centers during the war, Maj. Gen. Norman T. Kirk, surgeon general, last month issued the following statement:

As a result of the decrease in activities at armed forces induction stations and personnel centers throughout the United States, there has now become less need for assistance from civilian dentists and physicians in the making of physical examinations and the processing of personnel entering and leaving the military service.

To each and every one of you who have given so freely of your time and professional skill, may I take this opportunity to express my sincere and most grateful appreciation.

Without your help the job would have been much more difficult, and medical officers on active duty would have had to be detailed to these facilities when their services were urgently needed for the care of the sick and wounded as well as training for combat and other types of duty.

Our country is justly proud of the record established by the Medical Department in the recent conflict. I am cognizant of the fact that your help was essential in reaching the final goal. Again I say "thanks" for a job well done.

Pennsylvania University Professor Receives $500 A.D.A. Research Award

Arthur B. Gabel, of the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, has received a $500 award from the Council on Dental Therapeutics of the American Dental Association to assist in research in the functions of dentin in the human tooth.

Dr. Gabel, Darby professor of operative dentistry at the university, has been conducting experiments in the related problems of the mechanism of hypersensitive dentin and the innervation of dentin.

Senate Approves A.D.A. Bill For Dental Research Institute

The Senate on June 14 passed and sent to the House of Representatives a bill calling for establishment of a $2,000,000 National Institute of Dental Research.

The measure, sponsored by the American Dental Association, was referred to the public health subcommittee of the House Interstate and Foreign Commerce Committee. Hearings are expected to get under way sometime this month. Rep. J. Percy Priest, Tennessee, is chairman of the subcommittee.

Army Surgeon General Awarded Distinguished Service Medal

Maj. Gen. Norman T. Kirk, surgeon general of the Army, was recently awarded the Distinguished Service Medal by Gen. Brehon Somervell, commanding general of the Army Service Forces, in recognition of his "outstanding leadership . . . in directing the largest Medical Department in the history of the United States Army."

Army and Navy Dental Officers Decorated for War Achievements

Seven army dental corps officers and one navy dentist recently received decorations for outstanding war achievements. Recipients and their awards are: Lt. Col. Roy L. Bodine, Jr., Silver Star; Col. Harry M. Deiber and Col. Dell S. Gray, Legion of Merit; Capt. Claude P. Daniel, Capt. Clyde A. Emery and Maj. Edward E. Rose, Bronze Star; Col. Thomas C. Daniels, Army Commendation Ribbon; and Lt. Cmdr. Homer C. Vaughan, Navy Commendation Ribbon.

Bodine.—Colonel Bodine received the Silver Star, together with the Purple Heart, at Madigan Hospital Center, Fort Lewis, Wash. The Silver Star was awarded for gallantry in action on Bataan in April 1942. Colonel Bodine, then a

major, was supervising officer of the 101st Medical Collecting Company at a time when the enemy was threatening to overrun the main line of defense. The citation read in part:

Even though nearby infantry companies were withdrawing on both flanks, Major Bodine, with utter disregard for his personal safety, continued to devote himself to the wounded in many forward and completely exposed positions and assisted in the evacuation of casualties despite fierce enemy onslaughts.

Colonel Bodine recently was released from a Japanese prison camp in Korea, one of 300 survivors of a group of 1,600 Americans shipped from the Philippines to Japan in December 1944. A regular army dental officer, he will remain in service.

Deiber.—Colonel Deiber, formerly of Washington Court House, Ohio, received the Legion of Merit at a ceremonial review in William Beaumont General Hospital, El Paso.

The award was presented for "exceptionally meritorious" service as dental surgeon in the Hawaiian department, with the army forces in the Central Pacific and as dental consultant for the entire Pacific area. The citation read in part:

Colonel Deiber planned, organized and shaped policy of dental service, attaining a high degree of professional accomplishment. By his initiative and administrative acumen, he surmounted major problems of supply and the shortage of dental officer personnel, assuring thorough expeditious care for the troops in the vast area.

A veteran of thirty-two years of service in the Army Medical Department, Colonel Deiber came to Beaumont last January after three years as chief of dental surgery in the Central Pacific. He is a graduate of Ohio State University, Columbus.

Gray.—Colonel Gray, regular dental corps officer, received the Legion of Merit for his outstanding service as dental surgeon in the China-Burma-India theater of war from December 1943 to November 1945. The citation read in part:

As Theater Dental Surgeon, Colonel Gray was responsible for coordinating the activities of all dental officers of the Ground Service and Air Forces in the theater. He established portable prosthetic laboratories in strategic locations throughout the theater, eliminating the air evacuation of dental patients from forward areas, thereby enabling key men to remain on their regular duties. He initiated modern methods in the prevention and control of oral diseases and instituted the most advanced means of treatment for the large number of maxillofacial wounds and injuries occurring among the American and Chinese combat forces.

Col. Dell S. Gray, regular officer of the Army Dental Corps, who recently received the Legion of Merit for his outstanding dental service in the China-Burma-India theater.

Daniel.—A citation accompanying the medal awarded Captain Daniel, formerly of Bogalusa, La., read:

While a prisoner of war in Japanese Prison Camp Number One, Cabanatuan, Philippine Islands, from October 1944 to January 1945, he performed services as chief of dental service

and practicing dentist in a general hospital. With improvised makeshift equipment and depleted medical supplies, he labored against great odds and on a starvation diet. At the demand of the Japanese administration he gave dental care to the enemy garrison. His excellent work and the manner in which he performed it were important factors in maintaining endurable associations with the Japanese captors. His continued cheerfulness in the face of arduous and hazardous duties and his unusual accomplishments despite limited facilities were an inspiration to his fellow prisoners of war.

Emery.—Captain Emery, dental surgeon of the Seventh Infantry Division in Korea, won the Bronze Star for meritorious service from May 1942 to July 1945, during which time he participated in the campaigns of Attu, Kwajalein, Leyte and Okinawa. The citation read:

Through these four major operations he persistently and efficiently executed his duties as Dental Officer, often under extremely difficult field conditions. He gained the absolute confidence of the officers and enlisted men through his professional ability, conscientiousness and willingness to work. Captain Emery's outstanding devotion to duty and performance of work reflect great credit upon himself and the military service.

Captain Emery was graduated from the College of Dentistry, University of California, in 1929.

Rose.—Meritorious services with the Army Dental Corps in support of combat operations in Italy from November 25, 1944, to May 2, 1945, won the Bronze Star for Major Rose. His citation read in part:

As officer in charge of a mobile dental laboratory, Major Rose rendered superior dental care and emergency treatment to combat troops within division areas. Throughout this period he maintained a smoothly functioning team, despite frequent enemy shelling and the constantly changing combat situation.

During the rapid advance through the Po Valley, he devoted his efforts to rendering emergency dental care and treating casualties suffering from injuries of the face and jaw.

Major Rose holds the Army Commendation Ribbon, awarded for his work as chief of prosthetics in the dental department of Walter Reed General Hospital, Washington. He is a graduate of the School of Dentistry, University of Pittsburgh.

Daniels.—Colonel Daniels, Pomeroy, Ohio, was cited for his service as dental surgeon of the third service command headquarters in Baltimore from January 1944 to last March.

The citation was made for his "superior ability in the development and promotion of sound dental policies and practices" and for his work in establishing and maintaining "high standards of performance throughout the service command." The citation read in part:

By his leadership, initiative, energy and tact he contributed materially to the successful accomplishment of the mission of the service command, which reflected great credit upon him and the dental profession.

Colonel Daniels entered military service in 1915 and served in the Philippines in the first World War. Since that time he has been assigned to many posts, including Fort Myer, Va.; Fort Sam Houston, Texas; and stations in Alaska and Panama. He is a graduate of the Ohio College of Dental Surgery.

Vaughan.—Commander Vaughan received the Navy Commendation Ribbon for "meritorious conduct" as dental officer in charge of the prosthesis laboratory at U. S. Fleet Hospital No. 111 during the Iwo Jima and Okinawa campaigns from February 15 to June 30, 1945. The citation read in part:

As officer in charge of all cases requiring maxillofacial restoration, many of which were extremely difficult, he was in a large measure responsible for restoring many cases to duty and preparing others for further evacuation to rear areas. He performed his duties in a proficient and skillful manner and his actions were at all times in keeping with the highest traditions of the United States Naval Service.

REPORTS OF COUNCILS AND COMMITTEES

COUNCIL ON DENTAL HEALTH

DENTAL HEALTH GOALS

In a letter dated March 18, 1946, Sen. James E. Murray, chairman of the Senate Committee on Education and Labor, requested the American Dental Association to recommend dental health goals which can be achieved in a five-year period "if we fully mobilize our health resources and take full advantage of the rapid progress that is being made in the arts of prevention, diagnosis and care."

Senator Murray stated that he was making a similar request of other leading professional organizations in the field of health and medical care. In the field of dental health he requested that special consideration be given to goals in preventing or controlling dental defects, and to aims with respect to dental education and the number and distribution of dentists, hospitals, health clinics and health centers.

Senator Murray's request was referred to the Council on Dental Health. After consultation with other committees of the American Dental Association, the Council prepared a statement of dental health goals which it believes are based on sound principles and which are in agreement with the recommendations of the House of Delegates:

General Consideration

It is a generally accepted fact that the task of creating a higher level of dental health in this country is one of the most difficult of all public health problems. The fundamental reason for this condition is that dental diseases have an almost universal incidence. Furthermore, the treatment of dental diseases and the correction of dental defects usually require operative procedures which are not readily adaptable to mass treatment.

In the establishment of long-range plans for attacking the dental health problem, it is logical that the basic goals be (1) the prevention of dental diseases, (2) the improvement of standards in health service and (3) the extension of that health service to ever increasing groups of the population.

It is self-evident that these basic goals will be only partly achieved for years to come and therefore need to be reinforced by intermediate objectives which can be partly or wholly accomplished in a five-year period.

In the selection of goals for a five-year plan, it is necessary that a number of essential facts be taken into consideration:

1. Each year almost the entire public is in need of some kind of dental care.

2. Authorities in the field of public health agree that any health problem of endemic or pandemic proportions can be attacked most effectively by preventive measures. Since dental diseases fall into these categories, it is essential that greatly increased emphasis be placed on research to discover effective preventive methods.

3. The incidence* of dental diseases

The Council on Dental Health is especially indebted to the secretary of the Council on Dental Education for assisting in the preparation of the statement of goals.

*Incidence (of disease) means the number of cases that occur in a time interval, usually a year.

can be reduced only by preventive procedures. In the absence of preventive agents the next choice is to reduce the prevalence* of dental diseases and defects. The prevalence of dental diseases and defects can be reduced most effectively by concentrating on the dental needs of children.

4. So long as nearly all of the population over 3 years of age need periodic dental treatment, an organized dental care program for all age groups will remain an impossibility unless more personnel is trained and distributed more evenly in the population.

5. Ability to pay for dental care is often an important factor in obtaining it. With the exception of the rich and the very poor, the family budget of the American people is very susceptible to economic conditions, to catastrophic illnesses, to poor or good management, to the desire for expensive luxuries, to the advertising appeal to buy consumer goods. The ability to pay for dental care varies with the degree of impact these factors have on the family purse, but it also is largely governed by the choice that is made between luxuries and dental services.

6. Indifference to dental health must be attacked as vigorously as other phases of the problem. It is well known that many persons, adults as well as children, do not seek dental care although it is available to them.

Goals for Preventing and Controlling Dental Defects

Prevention.—Knowledge of dental disease prevention and the ability to apply new and proven preventive technics in the next five years will depend in a large measure on the support dental research receives.

In previous years dental research has been conducted by only a few properly trained workers and usually under most unfavorable conditions. It has been difficult to obtain qualified personnel for dental research in the past, largely owing to the lack of funds. Federal support of dental research would supply the financial means to initiate, stimulate and accelerate investigations into preventive methods and other fields of dental science.

Need for New Resources.—One of the immediate goals, therefore, is to secure the enactment of Senate Bill 190 which would provide funds:

1. To establish a National Institute of Dental Research.

2. To conduct, assist and foster researches, investigations, experiments and studies relating to the cause, prevention and methods of diagnosis and treatment of dental diseases and conditions.

3. To promote the coordination of researches conducted by the Institute and similar researches conducted by other agencies, organizations and individuals.

4. To provide fellowships in the Institute, from funds appropriated or donated for such purposes.

5. To secure for the Institute consultation services and advice of persons from the United States and abroad who are experts in the field of dental diseases and conditions.

6. To cooperate with state health agencies in the prevention and control of dental diseases and conditions.

Controlling Dental Defects.—Contrary to general belief, dental diseases and defects can be controlled in a large segment of the population through the organization of community dental health programs that are based on seven broad objectives:

1. Help every American appreciate the importance of a healthy mouth.

2. Help every American appreciate the relation of dental health to general health and appearance.

3. Encourage the observance of dental health practices including personal care, professional care and proper diet.

*Prevalence (of disease) means the number of cases that exist on a given date.

4. Enlist the aid of all groups and agencies interested in the promotion of health.

5. Correlate dental health activities with all generalized health programs.

6. Stimulate the development of resources for making dental care available to all children and youth.

7. Stimulate all dentists to perform adequate dental service for children.

Dental and public health authorities are agreed that organized dental care programs should be centered in the early detection and treatment of dental defects in children. It is also an accepted fact that the program should begin with complete initial care for young children followed by continuing maintenance care. This view is supported by Surgeon General Thomas Parran[1] of the U. S. Public Health Service. He stated:

> The problem of dental caries grows like a snowball, like compound interest. And up to now we have measured—not only the annual attack rate of dental caries—but we have measured all the past years of accumulated neglect. It would seem to be sensible, assuming that we cannot multiply by several times the number of dentists overnight, nor can we secure overnight tremendous increased expenditures on the part of the general public for dental care—that we can do the best job, under present knowledge of preventive dentistry, by taking care of the annual crop of new dental defects which appear in grade-school children.

It is not the purpose here to suggest methods for organizing and maintaining community dental health programs for children, but it should be pointed out that the dental profession and dental public health officials have gained considerable experience in this field. Their advice and assistance should be sought by those who contemplate the adoption of plans for dental care.

Every community should support a comprehensive dental health program for children. The provision of dental care in community programs should be based on the principle that dental health is the responsibility of the individual, the family and the community, in that order. When this responsibility, however, is not assumed by the community, it should be assumed by the state and then by the federal government. The community in all cases should determine the methods for providing services in its area.

While it is true that some communities do have effective dental health programs, it is also true that such programs have never received a fair proportion of public funds allotted for health services. The amount of money budgeted for dental health plans at the state level in the United States for the fiscal year 1941 was only 0.6 per cent of the $109,000,000 budgeted from all sources for cooperative health work. The size of the dental disease problem is far out of proportion to the small percentage of funds now allocated for dental purposes. Past experience has demonstrated conclusively that the successful expansion of dental health programs will not be possible until funds are specifically allotted for this purpose.

Therefore, it should be one of our goals to expand community dental health programs for children. The primary objective of these programs should be to prevent the accumulation of dental needs through a systematic plan of maintenance care in young age groups. This goal can be reached economically and efficiently through the enactment of Senate Bill 1099 which would make provisions for assisting communities "to develop and maintain more effective measures for the prevention, treatment and control of dental diseases including dental care programs for children, and to develop and maintain effective means for the education of the public concerning dental diseases."

1. Parran, Thomas: Dentistry as a Health Service. In the Proceedings of the Dental Centenary Celebration, American Dental Association, Baltimore, March 18, 1940, p. 59.

Goals for Dental Services in Hospitals and Health Centers

Since dental treatment is an inseparable part of a complete health service, it follows that adequate dental facilities should be provided in hospitals and health centers.

Dental care is a necessary part of the treatment of many medical and surgical conditions for hospitalized patients. Cooperation between medicine and dentistry is imperative in modern hospital practice. In addition, there are patients who are admitted primarily for the treatment of oral conditions, such as the repair of traumatic injuries about the jaws, surgical eradication of oral infections, correction of oral abnormalities and the treatment of other acute or chronic infections of dental origin. These patients should have the benefit of an efficient dental service. Therefore, it should be the aim to secure the adoption of basic standards of hospital dental service as recommended by the Committee on Hospital Dental Service of the American Dental Association as soon as circumstances will permit.

It is also evident that a federal law will soon be enacted to provide for surveys to determine the need for hospital and health center construction and to construct such hospitals and health centers in areas in which they are needed. Thus, it should also be the goal to determine the need for dental facilities in the hospitals and health centers to be constructed and to include adequate dental facilities in the proposed health centers so that it will be possible to provide dental care for inpatients and outpatients.

Goals for Dental Education and the Number and Distribution of Dentists

The aims for the next five years with respect to the number and distribution of dentists should be based upon facts. The ratio of dentists to population as shown by census reports increased uniformly in this country from 1840 to 1930. There was a population of 14,224 to one dentist in 1840 and a population of 1,728 to one dentist in 1930. For the first time in one hundred years this trend was reversed during the decade from 1930 to 1940. The census of 1940 showed a population which increased the ratio to one dentist for every 1,865 persons.

The total enrollment in the dental schools for the academic year 1930-1931 was 8,129 and for the year 1939-1940 it was 7,407. This drop in enrollment in the last decade coupled with the increase of population accounts for the decrease in the ratio of dentists to population. The opening years of the present decade, before the full effect of the Selective Service was noticeable, were marked by an upward curve in the enrollment which increased from 7,720 in 1940-1941 to 9,014 in 1943-1944. There is every reason to believe that, except for the interruption of the war, the enrollment would have steadily increased to the point of the full capacity of the thirty-nine schools in operation. That capacity has been estimated to be between 10,000 and 11,000.

The full operation of the Selective Service program reduced the enrollment of entering students as of October 15, 1945, by more than 50 per cent, that is, from 2,496 in 1944 to 1,201 in 1945. This decrease is temporary. All signs now indicate an unprecedented enrollment of freshmen in the autumn of 1946. The number of returning members of the armed forces qualified for and interested in the study of dentistry is much greater than was anticipated. This reservoir of new students will be exhausted in a year or two. Therefore, if Selective Service continues, the number of new students will be dependent on the number of deferments for professional study.

Awakened interest in the benefits of adequate dental care and movements,

local and national, in behalf of public health seem to point conclusively to the need of a higher ratio of dentists to population. Quite apart from the social measure under consideration for the extension of dental care to all the people, it is of the utmost importance that a steadily increasing flow of new entrants to the profession be provided.

The immediate goal, therefore, of the next five years in respect to the number of qualified dentists is the enrollment of dental students to the full capacity of the dental schools. A new school is to be opened in October 1946, and consideration is being given to the establishment of three or four additional schools in strategic locations. These movements deserve encouragement since the supply of dentists to meet present and future demands is now inadequate. This is an issue which cannot be solved by setting goals on a five-year basis.

Whatever the demonstrated demand for dentists, it cannot be expected that dental schools will multiply rapidly. Society must come to realize that basic to the broad extension of dental care is adequate support of a system of dental education. The biggest problem in dental education today is the lack of material support for maintenance of a satisfactory program of instruction. At the present time, fully half of the dental schools in the United States rely largely upon income from students and patients for support. Experience has shown that the dental school of the future must have additional support from other sources. Universities, both public and private, disposed to engage in dental education, will not embark upon such an undertaking in the future without assurance of adequate support. This is a problem which will continually confront all agencies which seek to extend dental care.

The existing supply of dentists is not distributed evenly in the population. Dentists tend to congregate in the highly populated centers and in the large cities to the distinct disadvantage of the population in the smaller cities, villages and rural areas. The cities of the United States with a population of over 15,000 have about half the population of the nation and more than 70 per cent of all dentists. This does not mean that there is an excessive supply of dentists in the larger cities, but rather that there is a shortage of dentists in the smaller cities and rural areas.

Another definite goal of the next five years may well be the adoption of measures to make dental practice in rural areas more rewarding and attractive. More intensive recruiting of dental students from the areas most in need of dental services will help to solve this problem, for it is well known that dental students tend upon graduation to go back to their home areas to engage in practice.

It cannot be emphasized too strongly that the suggested five-year goals do not immediately solve the larger issue of continuing dental care for all the people who need it regardless of their ability to pay for it. This broader issue cannot be solved overnight or by the mere enactment of laws by states or central government. The whole economy of the nation is involved. The extension of the benefits of the art and the science of dentistry in their full possibilities to all the people, by whatever social process, will require statesmanship, professional devotion and careful planning quite beyond any of the remedial measures yet proposed.

Unless a constructive beginning is made upon this great problem, however, the larger issue of dental care for all of the people will always be elusive. The establishment of the following goals for achievement in a five-year period will make an effective start on a problem whose solution has already been too long delayed:

1. The prevention of dental diseases by discovering more effective methods of

attacking the presently unknown causes of dental diseases; the support of such intensified research with adequate funds, personnel and facilities.

2. The control of dental diseases by the expansion of community dental programs, integrated in the general health program, to provide every child with dental care and dental health education, regardless of income or location. These programs should be maintenance programs centered in the control of the annual increment of new dental diseases in children.

3. The provision of additional facilities and uniform standards for dental care by making dental services available in hospitals and health centers for inpatients and outpatients.

4. The recruitment of an annual enrollment of dental students equal to the capacity of all dental schools in order to increase the number of qualified dentists.

5. The adoption of measures to make dental practice in smaller cities and rural areas more attractive and rewarding in order to procure a better distribution of dentists.—*Allen O. Gruebbel, D.D.S., Executive Secretary.*

PROSTHETIC DENTAL SERVICE COMMITTEE

PLAN OF OPERATION

The following program is the result of the cumulative efforts of the prosthetic dental service committees during the past few years. It is a step toward the solution of problems involving the dental profession and the dental laboratory industry. These problems are many and varied, and will require much more constructive thought and even experimentation before they are all satisfactorily solved.

The general functions of the committee are stated to cover a wide range of activities. Many of these activities will require considerable time before they are put into operation. All of them require cooperation by the parties involved. Machinery has been set up for some of them, notably the liaison function of state and American Dental Association committees with the dental laboratory organizations, the interchange of articles between the profession and the laboratory operators and the plan for accreditation of dental laboratories.

The program for accreditation of dental laboratories is set up and approved, and is ready for operation. The complete plan, application blanks and inspection forms are being furnished to all states requesting them.

The committee recognizes the fact that conditions are not the same in all of the states. Some modifications may have to be made in the nature of local interpretation to fit the existing conditions. It is the hope of the committee that this work will serve as a guide, and as a means for gaining further information regarding the solution of the problems.

Functions of the Committee

The functions of the Prosthetic Dental Service Committee of the American Dental Association are:

1. To inaugurate and direct an aggressive educational program through the pages of the official American Dental Association Journal and state dental journals and through the periodicals of the dental laboratory industry. This program will call attention to illegal practices on the part of the profession and the dental laboratories which jeopardize the health of the public. It will call attention to the respective responsibilities of the profes-

sion and the dental laboratories. It will call attention to common deficiencies in impressions, jaw relations, etc., which are furnished to the dental laboratories. Also, it will call attention to the common errors in the work produced by dental laboratories.

2. To encourage and cooperate with the various state boards of dental examiners in warning and prosecuting violators of the various state dental laws.

3. To encourage the dental laboratories to use fair business practices with the dental profession and with each other for the best interests of public health, by recognition of those laboratories which meet the requirements as set up by the committee.

4. To serve as a liaison between the dental profession, and the dental laboratories and dental technicians, so that problems, national in scope, will be solved by mutual cooperation. The respective state prosthetic dental service committees will serve as a liaison between the profession and the dental laboratories in the solution of dental laboratory problems in their respective states.

5. To set up requirements for accreditation of dental laboratories.

6. To supervise inspection of dental laboratories for accreditation, or for a continuation of accreditation.

7. To issue a certificate of accreditation to those laboratories who meet the requirements for accreditation as set up by the committee.

Complete Plan for Accreditation of Dental Laboratories

Definition

1. Accreditation of dental laboratories is the recognition by the American Dental Association of dental laboratories which meet the requirements and standards for dental laboratories as set up by the Prosthetic Dental Service Committee of the American Dental Association.

Purpose

2. The purpose of accreditation is to develop and maintain a mutually helpful relation between the dental profession and the dental laboratories for the best interest of the health of the public.

Administration

3. The administration of the accreditation of dental laboratories is under the direction of the Prosthetic Dental Service Committee acting under the authority of the House of Delegates of the American Dental Association as of October 1944. This committee establishes the general policies for accreditation of dental laboratories and coordinates the activities of corresponding prosthetic dental service committees in the various state societies. The adoption of the plan for accreditation of dental laboratories and the appointment of a state prosthetic dental service committee is voluntary by each constituent state society. This state society committee is assigned the supervision of accreditation in its respective state.

Organization

4. This plan shall be supervised by a standing committee of the American Dental Association which shall be nominated by the Board of Trustees and elected by the House of Delegates and known as the Prosthetic Dental Service Committee. The committee shall consist of five members, one of whom shall be designated as chairman of the committee by the Board of Trustees. The first year one member shall be elected to serve for five years, one for four years, one for three years, one for two years and one for one year. Thereafter one member shall be elected to serve for five years. The committee may recommend principles relative to dental prosthetic programs which shall be referred to the House of Delegates for action, and serve as the liaison between the dental profession, and the dental laboratories

and dental technicians. To this committee shall be referred all matters pertaining to the prosthetic dental service program. The committee shall represent and serve the profession in matters concerning laboratories and technicians.

5. A full-time dentist-secretary, approved by the Prosthetic Dental Service Committee, to carry on its programs, under the supervision of that committee, shall be appointed by the Board of Trustees.

6. Each state dental society shall assist in the operation of the plan within its own state. It shall provide a standing prosthetic dental service committee under whose jurisdiction the dental laboratories of that state may be inspected and accredited.

Fees

7. The expense of this program will be borne jointly by the American Dental Association, the participating state societies and the dental laboratories. The annual fee for accreditation shall be $10 for all laboratories with five or less employees. The annual fee for laboratories with more than five technician employees shall be on the basis of $2 per technician employee, with a maximum annual fee of $250. The fee is to accompany the application for accreditation. The fee is not returnable if accreditation is revoked. Laboratories with fluctuating numbers of technicians will pay fees according to the average number of technician employees during the previous year.

a. The fees as set up in this program are to hold for one year, and will be revised according to the needs of the program.

b. Fifty per cent of the income to the American Dental Association from each state for the purpose of accreditation shall be returned to that state dental society to supply funds for the carrying on of the prosthetic dental service program.

Application for Accreditation

8. Any dental laboratory having been established in business one year or more may apply for accreditation to the prosthetic dental service committee of the state in which it operates. The state prosthetic dental service committee will then investigate and inspect the applicant dental laboratory, and make its recommendation to the Prosthetic Dental Service Committee of the American Dental Association.

9. The Prosthetic Dental Service Committee of the American Dental Association shall accredit any dental laboratory which has met the requirements and inspection of any state prosthetic dental service committee. If approval for accreditation is denied by the state committee, the laboratory may appeal to the Prosthetic Dental Service Committee of the American Dental Association.

Certificate of Accreditation

10. The Prosthetic Dental Service Committee of the American Dental Association shall issue to each accredited laboratory an appropriate certificate. This certificate shall be renewed annually on the continued evidence of acceptability and the payment of the annual fee. Accreditation may be discontinued and the certificate may be recovered for cause upon the recommendation of the state prosthetic dental service committee.

a. If approval for renewal is denied by the state prosthetic dental service committee, the laboratory may appeal to the Prosthetic Dental Service Committee of the American Dental Association.

b. In case of revocation by the state prosthetic dental service committee, the laboratory may appeal to the Prosthetic Dental Service Committee of the American Dental Association.

Requirements for Accreditation

Dental laboratories must meet the following minimum requirements to be eligible for accreditation:

1. Must not violate nor permit technicians in their employ to violate the current dental laws of the state in which the laboratory operates.

2. Must render services only to legal practitioners of dentistry.

This section does not prohibit the construction of demonstration cases for laboratories or manufacturers.

3. Must not employ, nor retain in its employ, any technician who has been found guilty of a violation of a dental law in a court of record of any state, without the approval of the state prosthetic dental service committee.

a. A technician who has been found guilty of the above violation may appeal to the prosthetic dental service committee of the state in which he intends to work and, through it, to the Prosthetic Dental Service Committee of the American Dental Association.

b. An accredited laboratory may hire a technician who has been found guilty of violation of a dental practice act only with the approval of the state prosthetic dental service committee or of the Prosthetic Dental Service Committee of the American Dental Association on appeal.

4. Must conform to the regulations and prevailing standards of sanitation, health, labor and safety of the state and community in which it operates.

5. Must not, by any means, method or device, advertise to the general public.

6. Must not advertise services, technics or prices on the radio, or in any newspaper, magazine, periodical or any other publication available to the general public.

7. Must not advertise prices on any open or exposed mailing form.

8. Must not make statements or implications in advertising which are deceptive or misleading.

9. Must comply with, and follow explicitly, the written instructions of the legal practitioner of dentistry for the construction or fabrication of any dental appliance which it accepts for construction or fabrication when the instructions are furnished by the dentist.

This section is interpreted to mean that no change of design or substitution of materials may be made without the knowledge and approval of the legal practitioner of dentistry who requires the service, except by previous mutual understanding.

10. Must deliver with each completed dental appliance an itemized statement showing the name and quality of materials used in its fabrication.

11. Must have a staff of technicians adequately trained for the types of work which they are doing.

The interpretation of this requirement will be made by the state prosthetic dental service committee to conform to local conditions.

12. Must have adequate equipment for doing the types of work which are accepted by the laboratory.

13. Must have satisfactory credit relations.

14. Must agree to, and abide by, the code of ethics prescribed by the Prosthetic Dental Service Committee of the American Dental Association for the operation of dental laboratories, or a code of ethics which is satisfactory to the prosthetic dental service committee of the state in which the laboratory operates.

Code of Ethics

In order that dental laboratories may work harmoniously together for the best interest of themselves and the dental profession which they serve, the following code of ethics is prescribed.

General Deportment

1. It is the duty of every dental laboratory, and it shall be incumbent upon

every accredited laboratory, to govern its deportment in accordance with the underlying principles which have motivated the formulation of this code.

Advertising

2. All advertising by dental laboratories shall be directed to the dental profession.

3. Ethical advertising by dental laboratories may appear in magazines, journals or bulletins which are distributed only to dentists, dental laboratories and dental manufacturers.

4. It is unethical to advertise prices in any manner other than a sealed communication.

5. Advertising must be honest and in no way untrue, deceptive or misleading.

6. Signs may be used at the place of business of the dental laboratory, provided they are not of such a size or nature as to attract the attention of the general public.

Discrimination and Price Cutting

7. It shall be considered unethical to discriminate against any dentist by offering or rendering services at a price different from that offered to any other dentist on like terms.

8. It shall be considered unethical to have secret agreements to sell or offer for sale any service, merchandise or dental appliance at less than the cost of making, building, constructing, fabricating or replacing the same, *except* when a laboratory may remake, adjust or repair to the satisfaction of the legal practitioner of dentistry a defective dental appliance previously constructed by that laboratory.

Unfair Practices

9. It shall be considered unethical to mark or invoice falsely any product of a dental laboratory which would tend to mislead or deceive or defraud legal practitioners of dentistry as to the grade, quality, quantity, substance, character, nature, origin, size, finish, preparation or fabrication of the product.

10. It shall be considered unethical to defame, malign or falsely accuse any laboratory or dentist of dishonorable conduct or inability to perform services; to disparage the grade or quality of their materials or services, or to make any other false representations regarding them.

11. It shall be considered unethical to conspire with, aid or abet any person in the dental laboratory industry or in the dental profession in any unfair competitive practice.

12. It shall be considered unethical to conspire to fix prices in violation of the anti-trust laws of the state or of the United States.

Instructions to State Prosthetic Dental Service Committees

1. A meeting of the committee, together with the liaison committee or the officers of the state laboratory organization, should be called.

a. The committee should present the plan of operation of the Prosthetic Dental Service Committee of the American Dental Association, and should ask for support in its inauguration.

b. Ways and means of distribution of application blanks to those laboratories desiring accreditation should be discussed, and a plan for distribution should be decided upon.

c. Publicity for those laboratories which are accredited should be discussed.

2. The necessary number of application blanks and inspection forms should be obtained from the acting secretary of the Prosthetic Dental Service Committee of the American Dental Association.

3. Application blanks should be furnished to those laboratories desiring accreditation.

4. The applicant dental laboratory shall complete the application blank in triplicate, and retain the second copy.

The original and the first copy shall be sent to the designated person in the state prosthetic dental service committee, together with the required annual fee.

5. The state prosthetic dental service committee shall then arrange for the inspection of the applicant dental laboratory. The inspection forms shall be filled out in duplicate. The original shall be retained in the files of the state prosthetic dental service committee.

6. The state prosthetic dental service committee shall then forward the first copy of the application blank, the first copy of the inspection form and the total annual fee for the applicant dental laboratory to the acting secretary of the Prosthetic Dental Service Committee of the American Dental Association for each laboratory which it has approved.

7. The state prosthetic dental service committee shall forward the first copy of the application blank and the first copy of the inspection form to the acting secretary of the Prosthetic Dental Service Committee of the American Dental Association, but shall return the fee to any laboratory which it does not approve.

8. Certificates of accreditation will be issued immediately by the Prosthetic Dental Service Committee of the American Dental Association to those laboratories whose applications have been approved by the state committees.

9. All certificates issued prior to January 1, 1947, will be dated for the year 1947.—*Waldo H. Mork, D.D.S., Chairman; A. W. Sears, D.M.D.; Herbert W. Mason, D.D.S.; M. G. Cavanaugh, D.D.S.; and Carl O. Boucher, D.D.S., Acting Secretary, Ohio State University, Columbus 10.*

INTERNATIONAL RELATIONS COMMITTEE

MEDICO-DENTAL CONVENTION HELD IN MEXICO

The fifth medico-dental convention, organized by the Mexican Orthodontic Society, was held February 18-23 in the Dental College of the National University of Mexico, with leading dentists, orthodontists and physicians from the Americas in attendance. Countries represented were the United States, Canada, Mexico, Cuba, Costa Rica, Guatemala, Panama, Ecuador, Colombia, Peru and Venezuela.

Spencer R. Atkinson, of Pasadena, chairman of the North American delegation and honorary president of the Mexican Orthodontic Society, presented an illustrated paper on "Obtaining Optimum Results in Orthodontics."

Hermann Becks, of San Francisco, representing the Department of State, gave four addresses on "Dental Caries Prevention by Dietary Means in Orthodontic Practice," "Roentgenographic Interpretation of Dental and Periodontal Lesions," "Growth and Transformation of the Mandibular Joint in the Rat Under Normal and Altered Conditions," and "Latest Developments in the Relationship of Endocrine Disturbances and Vitamin Deficiencies to Conditions of the Oral Cavity."

Other United States speakers included Stanley D. Tylman, Chicago, "Prosthetics and Crown and Bridge Work"; Ralph Waldron, Newark, "Reviewing the Problem of Bimaxillary Protraction"; and Sidney Riesner, New York, "Sclerosing Agent in the Treatment of Subluxation of the Mandible and Oral Hemangioma."

Among other speakers were John M. Griffin, Hollywood, "Dento-Facial Orthopedics"; Drew H. Turner, Jacksonville, "Dental Public Health Service in Florida"; Taylor Drew, Miami, "Frac-

The Secretary of Foreign Relations of Mexico congratulating Spencer R. Atkinson upon his decoration with the Aztec Eagle. Left to right: Guillermo S. Gamboa, president of the convention; Dr. Atkinson; Samuel Fastlicht, secretary of the convention; Francisco Castillo Nájera, Secretary of Foreign Relations.

tures of the Maxillae"; A. W. Sears, Jacksonville, "Technic of Elastic Material Impression for Inlays and Bridges"; Capt. E. C. Morrow, Miami, "Treatment of Mandibular Fractures."

Also represented among United States speakers were A. Malcolm Smith, Miami, "Exodontia"; E. C. Lunsford, also of Miami, "Treatment of One Hundred Orthodontic Cases"; Roland Grubb, Glendale, "Psychological Aspect of Oral Surgery"; Gordon Ross, M.D., Pasadena, "Psychosomatic Aspects of Hypertension"; and E. W. Cartwright, M.D., also of Pasadena, "Extraperitoneal Cesarean Section."

Other United States delegates were Fred O. Conrad, Tallahassee; Lt. Howard K. Hyatt, Washington; and Col. Howard Taylor, Tampa.

Carlos Coro and Dario Gandarias Reineke, both of Cuba, spoke on "Social Aspect of Orthodontics" and "Treatment of Malocclusion, Class II, Division 1," respectively. Speakers also included two Guatemalan dentists, Manuel Ortiz Paiz, who spoke on "Growth of the Head of the Child from Birth to the Third Month of Life," and Ricardo C. Novales, who discussed "Ceramics in Dentistry."

Representing Colombia, José Mayoral discussed "Classification of Dento-Facial Anomalies." José Araujo Carrillo, of Venezuela, spoke on "Plan of Public Dental Health Service," and Augusto A. Taiman, of Peru, discussed "Orthodontic Teaching in the University of San Marcos, Peru."

Speakers from Mexico included Ignacio Chávez, M.D., "Problems of Local Anesthetics in Cardiovascular Diseases"; Miguel Morayta, "Frequency of Bacteremia During the Dental Extractions in Cardiopathies"; Eduardo Vergara Soto, M.D., "Growth, Ossification and Systematic Endocrine Problems"; Honorato Villa, "Central Relation and Impression, Fournet-Tuller"; Félix Léycegui, "Social Aspect of Dentistry in Mexico"; Mario González Ulloa, M.D., "Reconstruction of the Lower Lip"; Rafael Soto, M.D., "Infantile Hematopathies and Lesions of the Mouth"; and Miguel Bustamante, M.D., "Penicillin and Sulfonamides in the Treatment of Oral Infections."

Table clinics were conducted by Ramón Córdova, Jesús Pérez Romero, Abelardo Gutiérrez, Aurelio Galindo, Ralph Horne, Alberto Palacios, Francisco Martínez Lugo, Angel Alvarez de la Reguera, José Escamilla Andueza, Arturo Irabien Rosado, Enrique Aguilar, Félix del Paso, Manuel Valderrama, Jorge Aleman, Miguel Díaz Mercado, Roy B. Dean, Carlos H. Woodworth, Cesar Villarreal, Roberto Ruff, Roman S. Lascurain, Guillermo Riquelme, Roberto Woodworth and Samuel Fastlicht, all of Mexico. Also conducting table clinics were Drs. Waldron, Tylman, Lunsford and Griffin.

Delegates to the convention visited two new institutions in Mexico City—the National Institute of Cardiology and the Children's Hospital.

At the request of the dental societies and dental colleges of the Universities of Mexico, Guadalajara and Monterrey, the Mexican government decorated Dr. Atkinson with the Aztec Eagle for his work in the last eight years in helping to improve relations between Mexican and American professional men and

for his contribution to the field of orthodontics in the form of lectures and clinics before the Mexican dental profession.

Cooperating with the Mexican Orthodontic Society in presenting the convention were the Secretary of Foreign Relations, Francisco Castillo Nájera; the Secretary of the Department of Health and Social Assistance, Gustav Baz; the mayor of Mexico City, represented by the city council president, Francisco Doria Paz; the National University of Mexico; the American Ambassador to Mexico, George S. Messersmith; and Daniel F. Lynch, chairman of the International Relations Committee of the American Dental Association. Guillermo S. Gamboa was president of the convention.—*Samuel Fastlicht, Secretary, Medico-Dental Convention Committee.*

COUNCIL ON DENTAL THERAPEUTICS

WHAT MOUTH WASH SHALL I USE?

Emphasis by the dentist on proper dental and medical care rather than reliance on flavored or medicated mouth washes is important. Thus the impression that may be obtained by the public from indiscriminate advertising may be corrected. It is essential in the interest of the patient's welfare that he be educated in the necessity of regular examinations and the use of only accepted preparations.

The question which forms the title of this paper is asked frequently by dentists who desire a mouth rinse for routine use at the chair as a flushing or irrigating agent and for similar use at home by the patient.

Pure water will fulfill the most important requirements as a mouth wash. It is superior to flavored and medicated mixtures in many respects. The patient is already accustomed to the flavor of water and therefore it is not necessary to convince him that it tastes good; it is cheap, stable and readily available; and it is non-irritating and otherwise harmless, even if swallowed. Nobody is allergic to pure water, but flavored or medicated mixtures may produce allergic reactions in sensitive persons.

Isotonic solution of sodium chloride (normal saline) is favored by some dentists. It may be prepared simply by dissolving 9 gm. (approximately 2 teaspoonfuls) of sodium chloride in enough distilled water to make 1 liter.

Another convenient method for preparing normal saline solution is described by Moerke[1]: Saturated solution of sodium chloride in distilled water is maintained above a thick layer of salt in a large stock bottle. Salt or water is added as needed. The saturated brine is filtered into a smaller container as needed and the normal saline is prepared from this filtrate. Dilution of 2.6 cc. of filtered saturated brine to 100 cc. with distilled water produces a solution containing approximately 0.9 gm. sodium chloride per 100 cc.

Sterilization of the saturated brine by autoclaving or boiling does not affect the concentration of the cooled solution, which is still saturated. Agitation to get heavy layers of sodium chloride off the bottom of the first container is the main necessity in obtaining saturation.

Many readers of THE JOURNAL have read the reports of the Council on Dental Therapeutics in which it is made clear

The Council on Dental Therapeutics has authorized publication of this report.

1. Moerke, Georgine A.: Physiological Saline Without Weighings. J. Lab. & Clin. Med. 30:186, February 1945.

that the Council does not accept mouth washes which are marketed for indiscriminate use by the public.[2-5]

The dentist who uses water or isotonic solution of sodium chloride routinely and obtains his medicated mouth rinse mixtures from the pharmacist, using and prescribing such mixtures only when necessary, helps his patients to understand that it is his skill, rather than some pleasant-tasting and impressive mixture which he sprays into the mouth, that really is beneficial. He also helps his patient to realize that mouth washes marketed indiscriminately are not known to be useful or necessary in the maintenance of oral or general health.

The fact that many persons rely on medicated mouth washes when they should visit a dentist or a physician must result in numerous instances in serious delay in obtaining necessary treatment. For example, bad breath and sore throat are often symptoms of disease. The person who depends on mouth rinses to eliminate such symptoms or to prevent their development is fooling himself, perhaps to his own detriment.

In the light of current scientific knowledge, the dentists of America, in whose charge the oral health of the public rests, should not be parties, by example, to the perpetuation of the widespread habit of relying on commercial mouth washes for the protection or improvement of oral or general health.

2. Accepted Dental Remedies, Ed. 11, p. 152.
3. Mouth Washes. J.A.D.A. 19:1239, July 1932.
4. Lavoris—Not Acceptable for A.D.R. J.A.D.A. 31:1679, December 1, 1944.
5. Mu-Sol-Dent. J.A.D.A. 15:1977, October 1928.

PETER PAUL'S CHARCOAL GUM—NOT ACCEPTABLE FOR A.D.R.

Peter Paul's Charcoal Gum is marketed by Peter Paul, Inc., well-known confectionery manufacturer of Naugatuck, Conn. The radio advertising for this product has included statements with regard to the effect of this brand of chewing gum upon dental health and oral hygiene which are not supported by adequate evidence, so far as the Council is aware. An opportunity was given to the firm to supply evidence to support its advertising claims or to announce its intention of revising them in accordance with the facts. The firm has not taken advantage of this opportunity.

The following statements have been made in radio advertising for the product:

"Something new for you to chew. Different—delicious. Peter Paul's CHARCOAL GUM—the chewing gum with the refreshing ingredient—activated charcoal. Activated charcoal is well known to scientists as the modern purifier because of the wonderful way it purifies. And that's why Peter Paul put activated charcoal into Peter Paul's CHARCOAL GUM. When you chew this gum, see how it makes your mouth fresher, your breath sweeter, and how it helps remove tobacco and other stains from the teeth.

"Ask your candy man for Peter Paul's CHARCOAL GUM—the only chewing gum with the refreshing ingredient—activated charcoal. A nickel a pack and perfectly delicious. Good for your mouth—good for your breath—good for your teeth.

"With your first stick of Peter Paul's CHARCOAL GUM you'll feel a new sensation. Your mouth—your breath and your teeth will wake up, feel alive, refreshed. The secret? Activated charcoal. Long ago—scientists discovered that acti-

The Council on Dental Therapeutics has authorized publication of this report.

vated charcoal had an amazing ability to purify. Peter Paul heard about activated charcoal—said, 'What a marvelous ingredient for a chewing gum.'

"Now people—everywhere—are enjoying the benefits of Peter Paul's CHARCOAL GUM.

"Has a dentist or physician ever told you about activated charcoal? Activated charcoal is one of the most amazing purifiers known to science.

"And that activated charcoal is the wonderful secret of Peter Paul's CHARCOAL GUM—when you chew this gum, notice how your mouth feels delightfully fresh and sweet—and if you smoke a lot—remember, Peter Paul's CHARCOAL GUM helps to remove tobacco and other stains from the teeth. Try it.

"Why do people chew gum? Because they like the flavor—tastes good—relieves thirst—helps relax the nerves. There's one chewing gum that does all this—gives you enjoyment while you chew . . . plus something extra. Peter Paul's CHARCOAL GUM. Contains activated charcoal an ingredient almost magical in the way it adsorbs impurities.

"And that activated charcoal is the extra ingredient you get when you buy a pack of Peter Paul's CHARCOAL GUM. When you chew this gum . . . it not only tastes good—but does something extra."

Activated charcoal has many uses in industrial processes. However, evidence to show that it is a useful or desirable ingredient of chewing gum is totally lacking. So far as the Council is aware, Peter Paul's Charcoal Gum is not superior in any respect to other brands of chewing gum. The general use of chewing gum by the public has not been shown to be desirable. In fact, there are many reasons to suspect that its use may be deleterious to the oral health of some individuals. Chewing gum contains a large amount of sugar. Excessive chewing by those who are handicapped by defective occlusion might be expected to aggravate the pathologic changes which sometimes appear in the mouths of such individuals. Repeated artificial stimulation of saliva has not been shown to be desirable or without bad effects upon the digestive system.

To summarize, it has not been shown that the general use of chewing gum is a desirable or effective health measure or that it is without harmful effects. The incorporation of charcoal of any variety in chewing gum has not been shown to be desirable or to add to any cleansing effects which the chewing of gum may exert.

Peter Paul's Charcoal Gum is therefore declared unacceptable for A.D.R.

COUNCIL ON DENTAL EDUCATION

APTITUDE TESTING PROGRAM

For more than two years the Council on Dental Education has had under consideration the establishment of a series of mental and manual aptitude tests to be given each year to entering students in the dental schools. A committee of the Council, consisting of Bert L. Hooper, chairman, dean of the College of Dentistry of the University of Nebraska, J. Ben Robinson, dean of the Baltimore College of Dental Surgery of the University of Maryland, and John T. O'Rourke, formerly dean of the School of Dentistry of the University of Louisville and now director of graduate studies at Tufts College Dental School, gave preliminary consideration to the devising of the tests and the introduction of the program.

The American Association of Dental Schools has had a standing committee on

Shailer A. Peterson, Ph.D., new director of educational measurements.

aptitude testing for several years. In July 1944 the Council added the members of the association's committee to its own committee. The members were Ray V. Smith, professor of prosthetics and crown and bridge technic in the College of Dentistry of the State University of Iowa, Robert W. McNulty, dean of the Chicago College of Dental Surgery of Loyola University, and William E. Hahn, professor of anatomy in the Baltimore College of Dental Surgery of the University of Maryland.

This joint committee has had two extended formal meetings and has consulted specialists in the field of testing in different sections of the country. Shailer A. Peterson, assistant professor of education at the University of Chicago, has served on a part-time basis on the staff of the Council as director of educational measurements and has acted as secretary and adviser of the committee in the selection and construction of the tests. The Board of Trustees of the American Dental Association at a meeting on April 13 endorsed the program and appropriated funds for the Council in completing the plans for beginning the use of the tests with the opening of the dental schools in September and October. The tests will be designed for the entering classes but may be used for upper classes as well.

The tests will not be employed as a condition of admission but will be instituted with the hope of gathering data over a five-year period which will help to solve the question of who should study dentistry. The tests will be conducted without expense to students or schools. All schools have expressed their purpose to participate in the undertaking. The immediate objectives which the Council and the American Association of Dental Schools will propose have been formulated by the committee as follows:

1. To measure the student's ability to read with understanding the type of material that he will be expected to read in dental school.
2. To measure the student's ability to memorize verbal and visual material.
3. To measure the student's knowledge of both general and scientific word meanings.
4. To measure the student's mental ability.
5. To measure the student's ability to visualize patterns and relations without the necessity of preparing drawings.
6. To measure the student's ability to express himself orally and in writing.
7. To measure the student's ability to use his hands and fingers skillfully and dexterously.

The joint committee of the Council on Dental Education and the American Association of Dental Schools will continue to function in the promotion of the testing program. The inauguration of the program will be under the general super-

vision of the secretary of the Council and the organization and conduct of the program will be carried on by the director of educational measurements. Dr. Peterson will serve the Council in this capacity on a full-time basis beginning July 1, 1946. He is a native of Minnesota and earned his bachelor's and master's degrees at the University of Oregon. He earned his degree of Doctor of Philosophy at the University of Minnesota with a major in educational psychology and curriculum construction. He has served on the faculties of the University of Oregon, the University of Minnesota and the South Dakota State College, and at present is assistant professor of education and associate in research at the University of Chicago. He is also presently engaged as research consultant of the U. S. Department of Agriculture. Dr. Peterson's teaching and research interests have been in the natural sciences, statistics and testing. He has published the results of numerous studies in educational and scientific journals.

REQUIREMENTS FOR THE APPROVAL OF A COURSE OF TRAINING FOR DENTAL TECHNICIANS

The Council on Dental Education will consider for approval a course of training for dental technicians under the supervision of an approved, or provisionally approved, dental school.

The over-all pattern of the course and the stated objectives will be given first consideration. The method and effectiveness of accomplishing the objectives as set forth by the school will be an important factor in determining approval. It is recognized that some subjects may be taught more effectively than others in the same school, that some areas may receive greater emphasis than others, and that the pattern may undergo changes from year to year. Changes, if made on a basis of sound experimentation, will be encouraged.

The subjects of study should be of such selection and so coordinated that the student will acquire technical skills necessary to construct the restorative appliances prescribed by the dentist. In order that he may have an intelligent understanding of the bases of these technical procedures, the student should acquire a working knowledge of the related sciences upon which dental technics are based.

Adopted April 27, 1946.

Physical Plant

Evaluation of the physical plant and equipment will be based upon its adequacy, use and maintenance. Cleanliness, ventilation and lighting of buildings, laboratories and classrooms, along with other factors which contribute to efficiency, health and reasonable comfort of staff and students, will be taken into consideration.

Library

The library of the dental school normally should contain material adequate for the use of students enrolled in the course for dental technicians. However, there should be no lack of books and periodicals which have special reference to laboratory procedures and laboratory subjects. If desirable the dental school may set aside a separate reading-room for the use of dental technician students.

Organization and Administration

A course for dental technicians may be placed under the same organization and administration as that of the dental school, or may be operated as a separate division under separate administration, provided it is conducted as an integral

part of the dental school and on a similar level of discipline.

The functions of the administrative head, his freedom of action and his executive and professional ability, as well as the faculty organization, appointments, quality of teaching, salaries and tenure, will enter into the evaluation.

The faculty, as such, will be judged upon its ability to train technician students to a degree of knowledge and expertness to qualify them fully to meet the general requirements of the dental profession.

The number of faculty members in relation to the number of technician students, the qualifications of each teacher and his teaching load will be items for consideration. Evidence that staff members are conducting research projects will be expected.

Financial Provision

The adequacy of financial support allocated to the course will be given careful consideration by the Council. The wisdom with which funds are used in the management of the course will be observed.

Curriculum

For the reason that the training of dental technicians is a new venture in dental education, the Council recommends a flexible but well-balanced curriculum. Correlation of the various subjects is essential to an effective educational program.

The Council will consider the clearly stated objectives and purposes sought in the course, what it is expected will be accomplished for the student, for the dental profession and for the public, and how well the course succeeds in realizing and accomplishing the objectives and purposes. Intelligent curriculum experimentation which fosters growth, development and excellence is encouraged by the Council.

The Council suggests that the following subjects should be included in the course:

Orientation
Complete denture construction (technology)
Partial denture construction, fixed and removable (technology)
Dental anatomy
Dental materials, including applicable chemistry and physics
Ethics and jurisprudence
Laboratory management
Gross anatomy (lecture course)
Orthodontics (technology)
Special appliances (splints, obturators, etc.)
Ceramics

Admission

Graduation from an accredited four-year high school course or its equivalent, plus an interest in and an aptitude for the responsibilities of a dental technician, will constitute the requirements for admission to the course. The Council urges schools to adopt a suitable aptitude testing program for applicants to the course for dental technicians.

Length of Course of Study

The course shall be spread over two academic years (four semesters, or six quarters).

Enrollment

The Council recommends that the enrollment in a course for the training of dental technicians should be determined in the light of professional needs.

Certificate

The Council recommends that a certificate be given at the completion of the course, and that it be issued by the same agency as that which confers the diplomas for the dental school.

The certificate should be worded so that it cannot possibly be construed to mean, or to infer, that the recipient has had training for the practice of dentistry.

Policy of Dental School Concerning Laboratory Service for Dental Students

The Council recommends that the following policy be adopted by the dental school:

1. That students enrolled in the dental school shall have completed all technology and practice assignments of the dental curriculum and shall have demonstrated to their instructors their mastery of laboratory procedures before they may be permitted to use the service of students enrolled in the course for dental technicians.

2. That dental schools requiring student technicians to serve dental students shall provide special training for the dental student so that he will have a clear understanding of how to delegate routine technical problems to the student technician, in order to establish the best working relationship and maximum efficiency.

3. That any dental school not having sufficient practical laboratory cases to train its technician students may select an ethical dentist, or dentists, in a cooperative arrangement whereby the student may obtain part of his practical or applied laboratory training in the laboratory of the practicing dentist.

CASES AND COMMENTS

The Dental Condition of Japanese-Held American Prisoners of War

Charles A. Scrivener, D.D.S.,
Ottawa, Kan.

The atrocities perpetrated by the Japanese against their American prisoners of war have been widely publicized. Knowledge of the extremely deficient diet, the strained emotional state and the undesirable environmental conditions to which prisoners were submitted excited great interest in the physical examination of the repatriates. The effect that these conditions might produce on the incidence of dental caries was widely discussed among the dental officers in the forward areas.

It was fortunate that several naval dental officers who were interested in the results of these examinations were transferred to Fleet Hospital No. 103 situated on Guam. Twenty-two hundred and seventy naval personnel recently released from Japanese prison camps were being processed at this hospital. Complete health records were available, and much information was obtained by questioning the repatriates.

The estimated daily intake of food during internment averaged 600 to 1,200 calories. The latter represented an extremely high amount, which was allowed to those undergoing strenuous physical labor. The diet consisted chiefly of thin soup made from kang kong grass and weeds. Occasionally a few small fish and a bit of soybean paste were added to the porridge. Probably once a month a small amount of pork was provided, but it was evident only by flavor, the solid pieces of meat having been removed before the porridge was served. Rice was usually included in the diet and averaged 350-700 gm. per day. Blue maze, soybeans and corn meal on most occasions completed the slender menu. A fortunate few obtained an occasional Irish potato and a few buns made from corn meal and dark flour. Sugar was unobtainable in any form, although one man asserted that he was able to obtain a small amount of candy about once a month from a Red Cross package. Little salt and mineral substances were available.

It was not uncommon for a man to lose 50 per cent of his body weight, and the mortality was extremely high owing to disease, starvation, dehydration, exposure and maltreatment. Only 200 survived from one group which originally had 1,600 men. Another group of 238 diminished to 111 within a few weeks.

The food was heavy with shells, sand and rocks, which produced great attrition of the enamel surfaces and frequently fractured the teeth. Gingivitis was present in approximately 90 per cent of the men, although in most instances it was superficial and due to poor hygienic conditions.

Because of the fact that dietary, emotional, hygienic and other environmental factors are considered high on the list of causative factors of dental caries, it might be expected that rampant caries would exist in the mouths of all the persons subjected to such maltreatment. This, however, was not the case. Of those examined, 21.36 per cent showed no evidence of active caries, and in the entire group an average of only 0.85 cavities developed per man per year. Dental care during internment was practically limited to extractions.

It may be assumed that the diet, though lacking in quantity, was proportionately high in vitamin content and that the carbohydrates involved were not more deleterious because whole grain was used in the preparation of food products.

Inasmuch as it is not uncommon for dental patients to develop many more cavities that this average indicates, in much less time and when living under an apparently normal emotional and environmental state, it may be safe to assume that the emotional reactions of fear, anxiety, etc., together with undesirable environmental conditions and

low caloric diet, may have but little influence on susceptibility to decay.

The dentist who is enthusiastic about the control of caries by elimination of sugar from the diet will undoubtedly be pleased at these figures. But here is discouragement for him: 1. These men showed an average of only 0.34 cavities per man per year for the average time that they possessed their permanent dentition previous to their internment. 2. Of the men who had been caries-free previous to their internment, 49.76 per cent developed two or more cavities during internment. 3. The average age of these men was 30 years, an age at which the teeth are usually considered relatively caries-resistant.

The 2,270 naval personnel on whom data were obtained had an average age of 30 years and had spent an average of three years in a prisoner-of-war camp. The number of active carious lesions and fractured teeth in the group was 5,795. The average number of cavities developed per man in three years of internment was 2.55, or 0.85 per man per year. The number of cavities previous to internment was 15,607, an average of 6.87 cavities per man previous to internment and 0.34 cavities per man per year previous to internment. Of the total number examined, 485, or 21.36 per cent, showed no caries. Of the total, 213, or 9.38 per cent, were caries-free previous to internment; of these, 106, or 49.76 per cent, developed two or more cavities during the period of captivity.

The opinions of others are invited, but it is my belief, as this examination shows, that many of the heretofore accepted theories relative to the causes of dental caries are erroneous. Future developments will probably confirm this statement. It has been proved by Jay, Becks and others working in this field that the oral flora can be modified by diet. It appears that emotional and environmental factors have little influence in caries development. Therefore consideration must be given to the new field of antibiosis and its relation to caries activity.[1]
—*Masonic Temple Building.*

1. Schantz, C. W., and Scrivener, C. A.: New Observations on Inhibitory and Productive Factors in Dental Caries. J.A.D.A. 33: 180, February 1, 1946.

Horace Wells and the Hall of Fame

W. Harry Archer, D.D.S., B.S.,*
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Horace Wells, the discoverer of anesthesia, has been eligible for a place in the New York University Hall of Fame since that institution was founded in 1900. For reasons not entirely to the credit of dentistry, he was not even nominated until 1940, at which time he received only six votes out of approximately one hundred possible votes.

On the other hand, as a result of the interest and activity of the physicians of America, W. T. G. Morton, dentist and former pupil of Horace Wells, was nominated at the first opportunity, in 1900. Like Wells, in 1940, Morton polled only six votes in 1900. But he was renominated in 1905 (the Hall holds elections every five years), and this time received twenty-nine votes. Although this was not enough to elect him, it was nine more votes than the twenty necessary to insure his automatic renomination. He was voted on again in 1910, 1915 and 1920, receiving thirty-six votes in 1910, thirty-seven in 1915 and seventy (the required three-fifths majority for election) in 1920. The three-fifths majority rule for election was changed after the 1940 elections to a simple majority.

When Horace Wells was nominated a second time in 1945, and dentists were asked to support his candidacy, some expressed a pessimistic attitude toward his chances for election and supported their lack of interest by referring to his former defeat. The results of the 1945 election appear to sustain this defeatist attitude, for Wells again received only six votes. The purpose of this article is to challenge the defeatists, to tell them that they are wrong in their attitude, that Wells still deserves a place in the Hall and that dentistry should support him.

In 1945, over 1,000 names were suggested for the Hall of Fame. The Senate of the New York University reduced this number to 130 nominations. Wells survived this first action. Of the 130 nominees, seventy-six received no votes. Wells survived this second action also. Of the remaining fifty-four, four were elected. Those elected were Booker T.

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Washington, the Negro educator; Thomas Paine, author and publicist; Dr. Walter Reed of yellow fever research fame; and Sidney Lanier, poet. Wells stood fourteenth among the fifty who failed of election but received one or more votes. Fourteenth in a field of fifty and eighteenth in a field of 130 (not to mention the original 1,000) should not be discouraging. Wells is still in the race. His chances for election are good if dentistry will give him the proper support.

While it may be said with ample justification that Wells is still in the race, it should be added that he can never be elected until more people learn the true story of the discovery of anesthesia. This lack of knowledge has always been the difficulty in attracting adherents to Wells' support. The difficulty was recently removed to a degree not heretofore achieved when Howard Raper's book, "Man Against Pain,"[1] appeared.

Here, at last, is the instrument for telling both the public and the medical and dental professions the whole fabulous and factual story of the discovery of anesthesia. If we of the dental profession want to elect the discoverer of anesthesia to the Hall of Fame, now is our chance. Not that Raper's book is devoted to a defense of Horace Wells. It is not. Its loyalty is to the whole story. Wells and others are given the places they have earned. But that is sufficient to win the required support for Wells.

If we are to give Horace Wells a chance for election to the Hall of Fame in 1950, we must begin at once to plan and execute our campaign. Each of us should begin by reading Dr. Raper's book. We all need to know more about our greatest professional achievement. We should recommend the book to laymen, also, for they will find it entertaining and instructive. We must reach the people with this story if Wells is to be elected to the Hall four years hence.

We must act well in advance of the 1950 election in order to win the attention and interest of the electors early enough so that they may give the story of the discovery deliberate and careful consideration. They must not be hurried but must have time to challenge our story, discuss it and digest it. If we do this, preparing ourselves in the meantime by assimilating the story ourselves so that we may answer all questions honestly and intelligently, I have little anxiety regarding the outcome of the 1950 election.

Besides introducing the anesthesia story to the public, we should obligate ourselves to acquire a suitable bust of Wells to be placed in the Hall when he is elected. Other interested groups do this for their candidates. It is the required procedure, and, I suspect, a kind of test to determine the sincerity of the supporters of the various candidates. Dentistry has never been interested enough to pass this test.

One more point should be clarified. It is said repeatedly that Horace Wells cannot be elected to the Hall of Fame because W. T. G. Morton has already been elected as the discoverer of anesthesia. This is not true. Morton was not elected as the discoverer of anesthesia, although the effect of his election was to inadvertently give him that credit. He was elected, in the phraseology of the Hall itself, as "the first to give the world a demonstration of ether anesthesia." The Hall would not need to reverse itself to elect Wells and identify him with the discovery of anesthesia.

Wells was not elected because of confusion over the discovery, because the electors of the Hall of Fame do not know the Wells story. We must dispel that ignorance before the next election in 1950. It is one of dentistry's most urgent obligations. When we have met our own responsibility, it will then become the responsibility of the electors and authorities of the Hall of Fame. Let us accept the blame for the defeat of Horace Wells and move to correct the results of our negligence. —*Professional Building.*

1. Raper, H. R.: Man Against Pain. New York: Prentice-Hall, Inc., 1945.

CURRENT LITERATURE

Journal of Dental Research

December 1945

Titles marked with an asterisk are reviewed below.

*Effect of 2-Methyl-1, 4-Naphthoquinone on the Incidence of Dental Caries. D. Y. Burrill, J. C. Calandra, E. B. Tilden and L. S. Fosdick, Northwestern University.—273.

*Effect of Prolonged Ingestion of Synthetic Vitamin K in Rats. E. H. Hatton, A. Dodds, H. C. Hodge and L. S. Fosdick, Northwestern University and University of Rochester.—283.

*Test of the Effect of Fluoride-Containing Dentifrices on Dental Caries. Basil G. Bibby, Tufts College Dental School.—297.

*Observation of Increased Caries Activity Following Interruption of Topical Fluorine Applications. H. Berton McCauley and Peter P. Dale, University of Rochester.—305.

Salivary Dilution of 1-1000 Sodium Fluoride Solution Used as a Mouthwash. Walter A. Bossert, D.D.S., and James M. Dunning, D.D.S., New York City.—311.

*Isolation of Candida Albicans from a Root Canal Undergoing Penicillin Therapy. Henry A. Bartels, D.D.S., and Maurice Buchbinder, D.D.S., Columbia University.—315.

*Physiological Significance of Phospholipid in Human Saliva. Frances Krasnow, Guggenheim Clinic.—319.

Effect of 2-Methyl-1, 4-Naphthoquinone on the Incidence of Dental Caries. D. Y. Burrill, J. C. Calandra, E. B. Tilden and L. S. Fosdick.

In view of the fact that 2-methyl-1, 4-naphthoquinone inhibits the enzymic degradation of fermentable sugars, it was thought that this material could be used for the control of dental caries if administered during the time that carbohydrates would naturally be converted to acids with the subsequent production of dental caries. The synthetic vitamin K was administered in the form of chewing gum, immediately after each ingestion of food, for a period of eighteen months. Each chewing gum pellet contained 0.75 mg. of synthetic vitamin K. The number of new cavities, determined clinically and by roentgenographic examination, was compared with the number of new cavities in suitable control groups. It was found that dental caries was inhibited by the use of this procedure from 60 to 90 per cent, depending upon the basis for comparison.

Effect of Prolonged Ingestion of Synthetic Vitamin K in Rats. E. H. Hatton, A. Dodds, H. C. Hodge and L. S. Fosdick.

Rats were fed 2-methyl-1, 4-naphthoquinone and 2-methyl-1, 4-naphthoquinone sodium bisulfite addition product in concentrations from 0.1 per cent to 0.25 per cent of their diet for periods up to thirteen months. During this time, the rats were bred and the offspring of these rats were continued on similar diets. This procedure was practiced on three generations of rats. In addition to this, massive doses of 2-methyl-1, 4-naphthoquinone were incorporated into adequate diets in doses up to 0.8 per cent of the total diet. These latter rats were continued on the diet for 200 days.

The ingestion of the menadione and the sodium bisulfite addition product in concentrations up to 0.25 per cent of the diet produced no toxic symptoms in the rats and no pathologic changes were observed that could be attributed to the diet. On the higher levels of menadione for the 200-day period, reduction in growth rates was observed. The male rats which received doses up to 0.8 per cent of the total diet were found to have low red blood corpuscle counts and unusually large spleens. No other pathologic conditions were found.

Test of the Effect of Fluoride-Containing Dentifrices on Dental Caries. Basil G. Bibby.

To test the effect of the use of fluoride-containing dentifrices on the activity of dental

caries, 223 children in two orphanages and 163 dental students were divided into control and experimental groups. The children used liquid dentifrices containing 0.01 per cent sodium fluoride and a control liquid dentifrice during the first year. During the second year the fluoride content was increased to 0.1 per cent and the dentifrice was acidulated. The three dental student groups used a special fluoride paste, a fluoride-free paste or assorted dentifrices. The fluoride content of the paste was increased from 0.01 per cent to 0.1 per cent at the beginning of the second year of study. There was a loss of 100 children from the study groups during the period of the experiment. Mirror and explorer examinations at the end of one and two years of dentifrice use failed to reveal any reduction in dental caries in those using the fluoride dentifrice as compared with those using the fluoride-free dentifrices.

Observation of Increased Caries Activity Following Interruption of Topical Fluorine Applications. H. Berton McCauley and Peter P. Dale.

A consistent aggregate increase of 58 per cent in caries rate occurred in 361 teeth of twenty-one children, aged 2 to 13 years, in one year following suspension of a series of topical administrations of an aqueous sodium fluoride solution containing 0.1 per cent of fluorine, given periodically for a year. The finding suggests possible restriction of the caries-inhibiting effect of periodic topical fluorine applications in the absence of continued administrations.

Isolation of Candida Albicans from a Root Canal Undergoing Penicillin Therapy. Henry A. Bartels and Maurice Buchbinder.

Candida albicans was isolated under aseptic precautions in three successive cultures of a root canal made at approximately weekly intervals. This micro-organism is found infrequently in this region. It is insensitive to penicillin therapy.

Physiological Significance of Phospholipid in Human Saliva. Frances Krasnow.

This résumé covers studies on 215 cases representing both sexes and varying in age, economic status and general mode of living. The content of alcohol-ether soluble phosphorus in saliva approximates 2 per cent of that in blood. Physiologic malfunctions such as mouth dryness, fatigue, aphthous stomatitis, gingivitis, dental diseases and others are generally accompanied by values above the normal average, 0.12 ± 0.01 mg. The means for different groups are 0.16 ± 0.02, 0.18 ± 0.03, 0.21 ± 0.01, 0.26 ± 0.03, 0.29 ± 0.06, 0.33 ± 0.04, 0.35 ± 0.05. Similarly, a higher content obtains in those beyond 20 years of age than in younger persons. Thus, witness 0.19 ± 0.02 and 0.24 ± 0.02 mg., 0.22 ± 0.02 and 0.29 ± 0.06 mg., or 0.19 ± 0.03 and 0.34 ± 0.05 mg. In most of these subjects, blood analysis shows no aberration; hence the possibility of employing saliva chemistry as an early diagnostic aid with special significance for maintaining optimal well-being.

Journal of Oral Surgery
October 1945

Titles marked with an asterisk are reviewed below.

*Editorial: Graduate Training in Oral Surgery. C. W. Waldron, D.D.S., M.D., Minneapolis—265.

*Editorial: Maxillofacial Wounds. C. W. Waldron, D.D.S., M.D., Minneapolis—269.

*Control of Bone Fragments in Maxillofacial Surgery. Louis R. Weiss, D.D.S., Camp Atterbury, Ind.—271.

*Study of One Hundred Fifty Cases of Fracture of the Upper Jaw in an Overseas Maxillofacial Center. Henry B. Clark, Jr., M.D., D.D.S., St. Paul—286.

*Correction of Abnormal Mandibular Protrusion by Intra-Oral Operation. Sanford M. Moose, D.D.S., San Francisco—304.

*Avoidance of Severe Anoxia in Nitrous Oxide Anesthesia. Harry M. Seldin, D.D.S., New York City—311.

Unerupted Supernumerary Mandibular Bicuspids: Report of Case. Arthur M. Maris, D.D.S., Iowa City—317.

*Observations on the Definitive Treatment of Maxillofacial Injuries. Douglas B. Parker, M.D., D.D.S., New York City—320.

*Treatment of Gunshot Fractures of the Mandible. T. J. Cook, D.D.S.; H. P. Royster, M.D., and C. K. Kirby, M.D.—326.

*Acetylsalicylic Acid (Aspirin) as a Cause of Bleeding. Lester Cahn, D.D.S., New York City—336.

*Papillary Cystadenoma Lymphomatosum (Adenolymphoma) of the Parotid Region: Report of Case. John H. Gaskins, M.D., and Earl C. Padgett, M.D., Kansas City, Mo.—339.

Penicillin in Submandibular Cellulitis and Clinical Septicemia: Report of Case. Edward R. Ferro, D.D.S., New Orleans —344.

Graduate Training in Oral Surgery. C. W. Waldron.

Waldron discusses to some extent the need of graduate training in the specialty of oral surgery and proposes a basic plan for organization of such a training program. The time is not distant when the specialty of oral surgery will require of its practitioners adequate training and certification by national boards.

He relates three plans of operation whereby the student may complete a study of the related basic sciences together with his training in clinical and operative work. For this program he outlines the proposed minimum standards for graduate training in oral surgery.

Maxillofacial Wounds. C. W. Waldron.

The author praises the work of the maxillofacial units in the services and states that this work can be continued in civilian and industrial life to the great advantage of the patients concerned.

Control of Bone Fragments in Maxillofacial Surgery. Louis R. Weiss.

Weiss relates many important reasons for reduction and complete immobilization of fractures of the mandible and maxilla. He also mentions and illustrates, with considerable emphasis on the cast splint and its modifications, the various methods of treatment. In connection with rubber band traction he declares, "Rubber ligatures in all cases of early fracture fixation should be so strong that the patient may not counteract traction by voluntary muscular action. In the later stages of fracture treatment, reduction of the amount of rubber traction is favorable to union and a desired result, but only at this time."

He discusses means of stabilization of fragments in bone grafting for the edentulous and non-edentulous mandible.

Study of One Hundred Fifty Cases of Fracture of the Upper Jaw in an Overseas Maxillofacial Center. Henry B. Clark, Jr.

The etiology, diagnosis, classification, treatment, complications and disposition of 150 cases of fractures of the maxilla that passed through or were treated at a maxillofacial center in Italy during the period from April 1944 to February 1945 are tabulated and discussed by the author.

The various methods of treatment of the injured soft tissue and fractured bone, as well as the complications, are well tabulated and related. Regarding the primary suturing of wounds of the face, Clark reports, "We are of the opinion, after seeing all variations of primary suturing, that disfigurement and deformity can be prevented to a great extent by meticulous primary débridement and layer repair as soon after injury as possible." Together with other conclusions he stresses the greater importance of early surgical débridement and primary suturing than reliance on penicillin and other chemotherapy in controlling or preventing wound sepsis.

In summary he mentions the value of the modified Caldwell-Luc procedure when indicated.

Correction of Abnormal Mandibular Protrusion by Intra-Oral Operation. Sanford M. Moose.

Moose describes a technic and the principal instruments used for intra-oral bisection of the rami in mandibular protrusion. Some of the factors that must be taken into consideration prior to operation are discussed, as well as some of the possible complications following operation. Advantages of and objections to the intra-oral method are also considered.

Avoidance of Severe Anoxia in Nitrous Oxide Anesthesia. Harry M. Seldin.

The author states that there are no absolute contraindications for the use of nitrous oxide as an anesthetic except depressing levels of anoxia, and that this can and should be avoided in gas-oxygen anesthesia. His records show that the amount of oxygen necessary in the gas-oxygen mixture may vary from 5 per cent to 90 per cent depending upon the means and method of administration and upon the patient.

The purpose of Seldin's investigation is to prove that nitrous oxide-oxygen anesthesia can be administered without cellular asphyxia and that its danger is in maladministration and not in use.

Observations on the Definitive Treatment of Maxillofacial Injuries. Douglas B. Parker.

Parker compares methods of treatment of maxillofacial injuries of World War I and World War II. He observes apparently better results from the latter treatment and emphasizes the enhanced relationship and training of the plastic surgeon and the dentally trained maxillofacial or oral surgeon. Primary suture, bone grafts, splinting of fragments and other means of stabilization are fully discussed. Plastic correction of deformities, prosthesis, physiotherapy and psychotherapy are also considered.

Treatment of Gunshot Fractures of the Mandible. T. J. Cook, H. P. Royster and C. K. Kirby.

Cook, Royster and Kirby report the treatment and outcome of fifty-four gunshot fractures of the mandible that occurred during the North Burma campaign. Initial treatment, treatment of shock, evacuation, primary operation, which favors primary suture in selected cases, local treatment, secondary operations, chemotherapy, immobilization and complications are discussed. In regard to the treatment of osteomyelitis which occurred as a complication in twenty-four of the twenty-eight infected wounds, they state, "In recent years, the trend has been toward a radical approach to the problem, and extensive surgical drainage is carried out, both intra-orally and extra-orally, with removal of sequestra, foreign bodies, and infected teeth. Radical incision has been necessary even in the absence of sequestra."

Acetylsalicylic Acid (Aspirin) as a Cause of Bleeding. Lester Cahn.

Reports of other investigators are cited as evidence that the use of salicylic acid causes hypoprothrombinemia which could be prevented by simultaneous administration of vitamin K.

Papillary Cystadenoma Lymphomatosum (Adenolymphoma) of the Parotid Region: Report of Case. John H. Gaskins and Earl C. Padgett.

Gaskins and Padgett review the literature of the sixty-three reported cases of adenolymphoma of the parotid region, and discuss various theories as to the origin of the tumor. Their own case is also reported with gross and microscopic descriptions and illustrations. —*H. L. Hubinger.*

Experimental Studies on the Movements of the Mammalian Tongue. II. The Protrusion Mechanism of the Tongue (Dog). G. A. Bennett and R. C. Hutchinson. Anat. Rec. 94:57, January 1946.

Protrusive movements of the tongue are due to the action of the genioglossi and the intrinsic muscles. The genioglossi muscles pull the base of the tongue forward in the midline and fix its proximal two-thirds to the floor of the oral cavity, while the intrinsic muscles project it by means of an elongating process. The other extrinsic muscles are retractor muscles and can only alter the extent of protrusion. If the tongue is protruded by the action of the genioglossi and intrinsic muscles of one side, the weight or lag of the noncontracting half affects the direction of the protrusion in such a manner that the tip of the organ is contralaterally directed.—*Paul H. Keyes.*

Oral Manifestations of Iron Deficiency. W. J. Darby. J.A.M.A. 130:830, March 30, 1946.

Six cases are presented which illustrate that angular fissures and superficial glossitis may accompany chronic iron deficiency anemia of mild degree. Certain of these cases responded to iron therapy alone; others responded to iron administration after they had failed to yield to prolonged intensive treatment with various B vitamin preparations. The author points out the frequent confusion of these cases with B complex deficiencies and, in addition, the necessity of considering iron deficiencies in the interpretation of such oral changes as are recorded in nutrition surveys.—*R. Likins.*

LIST OF ARMY DENTAL OFFICERS SEPARATED FROM SERVICE

The following dental officers have been separated from service, according to lists received from the Dental Division, Office of the Surgeon General, U. S. Army. These lists are not complete. Publication will be given to other names as soon as possible.

	Alabama	
Jasper	Haston, Fred M.	Capt.
Montgomery	Cayton, Alfred M.	Lt. Col.
Montgomery	Miller, James L.	Maj.
	Arizona	
Tucson	Mauzy, Claude R.	Col.
	Arkansas	
Camden	Jerry, Lawrence T.	Maj.
Everton	Moore, William C.	Capt.
Fort Smith	Roberts, Martin M.	Capt.
	California	
Alameda	Cassani, Renato E.	Capt.
Alameda	McNulty, Frederick J.	Capt.
Altadena	Rice, Fred D.	Capt.
Berkeley	Bergemann, W. T.	Capt.
Berkeley	Siegfried, John, Jr.	Capt.
Chino	Voit, Harry O.	Capt.
Corona	Munn, William B.	Capt.
Culver City	Trotter, John C.	Capt.
El Monte	Dean, James H.	Capt.
Fellows	Heuler, Leo K.	Capt.
Glendale	Phillips, Charles S.	Capt.
Hayward	Julienne, David H.	Capt.
Hollywood	Craven, Harry B.	Capt.
Inglewood	Hodge, Donald J.	Capt.
Kentfield	Tuckey, Robert L.	Capt.
La Verne	Sillo, Frank	Capt.
Lindsay	Mead, Elmer L.	Capt.
Long Beach	Harvey, Edwin R.	Capt.
Los Angeles	Baron, Henry	Capt.
Los Angeles	Bird, William E.	Maj.
Los Angeles	Farber, Eugene H.	Capt.
Los Angeles	Furstman, Edward F.	Capt.
Los Angeles	Gherkins, Glenn A.	Capt.
Los Angeles	Greenberg, Arnold R.	Capt.
Los Angeles	Hahn, Arthur N.	Capt.
Los Angeles	Hewson, John M.	Capt.
Los Angeles	Holstein, Irving J.	Capt.
Los Angeles	Kenney, Harry	Capt.
Los Angeles	Koplin, Leon C.	Capt.
Los Angeles	Mahan, James H.	Capt.
Los Angeles	Mandel, Edward	Capt.
Los Angeles	Marks, Thomas H.	Lieut.
Los Angeles	Michaelson, George A.	Maj.
Los Angeles	Moran, Edgar B.	Capt.
Los Angeles	Pond, Howard M.	Capt.
Los Angeles	Reitz, Henry E.	Maj.
Los Angeles	Rubin, Jacob A.	Capt.
Los Angeles	Schurter, Joseph G.	Capt.
Los Angeles	Sewall, Gilbert O.	Capt.
Los Angeles	Simon, Carroll E.	Capt.
Los Angeles	Teege, Richard L.	Capt.
Los Angeles	Thornquist, John J.	Capt.
Los Angeles	Wilkins, Donald H.	Capt.
Los Angeles	Ziff, Martin	Lieut.
Madera	Peime, Leroy W.	Capt.
Manhattan Beach	Schmierer, William F.	Capt.
Napa	Buehler, William O.	Capt.
North Hollywood	Nelson, Charles F.	Maj.
Oakdale	Hollander, Eugene E.	Capt.
Oakland	Carnduff, Stanley F.	Capt.
Oakland	Dinneen, Gerard	Capt.
Oakland	McLeod, Charles H.	Maj.
Oakland	Seaman, James R.	Capt.
Oakland	Walter, Frank M.	Capt.
Oakland	Welty, Lloyd G.	Maj.
Ontario	Kaufman, Wilbert H.	Lieut.
Palo Alto	Wood, Cranville N.	Capt.
Pasadena	Moore, Joseph C.	Capt.
Pasadena	Palmer, Franklin S.	Capt.
Paso Robles	Gates, Russell W.	Capt.
Petaluma	Keller, John, Jr.	Capt.
Piedmont	Watson, Allan H.	Capt.
Piedmont	Yore, George M.	Maj.
Placerville	Schneider, William B.	Maj.
Sacramento	Olsen, Ralph H.	Capt.
Sacramento	Yee, Donald L.	Capt.
Salinas	Rogers, James T.	Lieut.
San Bruno	Weiss, William	Capt.
San Diego	Guichard, Leo L.	Lt. Col.
San Francisco	Blakemore, Thomas F.	Capt.
San Francisco	Davis, Philip R.	Capt.
San Francisco	Deitch, Benjamin V.	Capt.
San Francisco	Dunning, Philip A.	Capt.
San Francisco	Edlin, Raymond J.	Capt.
San Francisco	Felton, Bertram M.	Capt.
San Francisco	Fogarty, Martin A.	Capt.
San Francisco	French, William S.	Capt.
San Francisco	McKeown, Samuel A.	Capt.
San Francisco	McLaughlin, W. R.	Capt.
San Francisco	Mason, Kent S.	Capt.
San Francisco	Owens, John T.	Capt.
San Francisco	Pruitt, Lyford	Capt.
San Francisco	Sanoff, Nicholas	Capt.
San Francisco	Thodas, Chris A.	Capt.
San Francisco	Wachhorst, Newton E.	Capt.
San Francisco	Walley, William H.	Capt.
San Francisco	Wong, John F.	Capt.
Sanger	Gates, Charles E.	Capt.
San Leandro	Peirce, Ivor G.	Capt.
Santa Ana	Nall, Hubert H.	Capt.
Santa Maria	Case, Harold T.	Capt.
Santa Rose	McMannis, Edwin T.	Capt.
Sherman Oaks	May, Paul E.	Capt.
Sonoma	Patterson, William J.	Capt.
Stockton	Ferguson, Kenneth H.	Capt.
Stockton	Levy, Alvin T.	Capt.
Temple City	Riechel, Willard A.	Capt.
Tulare	Finch, Oscar E.	Capt.

Turlock	Anderson, Wesley W.	Capt.
Van Nuys	Wark, William C.	Capt.
Venice	Schonen, George E.	Lt. Col.
Walnut Creek	Potter, Dwight S.	Maj.
Watsonville	Knego, Peter S.	Capt.

Colorado

Canon City	Howe, Steward C.	Capt.
Colorado Springs	Brown, Paul E.	Lt. Col.
Colorado Springs	Chambers, Robert	Maj.
Colorado Springs	Downs, Bertram H.	Maj.
Colorado Springs	Ritchey, Beryl	Capt.
Colorado Springs	Runyon, Harold C.	Capt.
Colorado Springs	Shaw, Oren V.	Col.
Colorado Springs	Sinton, Joseph J.	Lt. Col.
Colorado Springs	Walden, Arthur H.	Capt.
Craig	Weir, Ross J.	Lt. Col.
Craig	Wootton, Richens L.	Capt.
Denver	Becker, Carryl M.	Capt.
Denver	Murray, Gordon W.	Capt.
Denver	Nelan, E. Stuart	Capt.
Denver	Pritz, Robert W.	Capt.
Denver	Warder, Walter E.	Capt.
Estes Park	Crowell, Hayde W.	Maj.
Longmont	Carr, Alfred N.	Capt.
Pueblo	Mordeaux, Guy L.	Capt.
Pueblo	Takaki, Harry H.	Capt.

Connecticut

Bridgeport	Liscio, Paul P.	Capt.
Bridgeport	Shapiro, Jack J.	Maj.
Chester	Geinstein, Stanley	Lieut.
Deep River	Bernstein, Charles W.	Capt.
Greenwich	Hennigar, William C.	Capt.
Hartford	O'Meara, William F.	Capt.
Mansfield Depot	Waldman, Bernard	Capt.
New Haven	Braffman, Samuel	Capt.
New Haven	Shure, Maurice D.	Capt.
New Haven	Walsh, James B.	Capt.
New London	Hauss, Howard J.	Capt.
Norwich	Goldberg, Abraham	Capt.
Southington	Forgione, Armond P.	Capt.
Stamford	Iovanna, Nicholas C.	Capt.
Stamford	Ketcham, Frank H.	Capt.
Stamford	Levine, Benjamin D.	Capt.
Terryville	Tyler, Edward C.	Capt.
Thompsonville	Scavotto, Anthony W.	Capt.
West Hartford	Brainerd, Edwin G.	Capt.
West Hartford	Levin, Monroe B.	Lieut.
West Hartford	Martin, John J.	Capt.
Westport	Bock, Edward	Capt.
Winsted	Sweeney, William N.	Capt.

Delaware

Wilmington	Melson, William F.	Capt.
Wilmington	Silverman, Sidney	Capt.

District of Columbia

Washington	Arends, Theodore G.	Capt.
Washington	Baker, Chester H.	Capt.
Washington	Frazer, David M.	Capt.
Washington	Hurney, Thomas A.	Lt. Col.
Washington	Keren, Louis I.	Capt.
Washington	Lewis, Bernard M.	Capt.
Washington	McLinn, Harry M.	Capt.
Washington	Silverman, Meyer M.	Maj.

Florida

Fort Myers	Grace, William W.	Maj.
Hollidaysburg	Barnhart, James B.	Capt.
Jacksonville	Moss, Arthur R.	Capt.
Miami	McKenzie, Olin G.	Capt.
Sarasota	Thomas, Monroe C.	Capt.

Georgia

Hillsboro	Wynens, William E.	Maj.

Hawaii

Honolulu	Sylva, Henry P.	Capt.

Idaho

Anthony	Smith, Donald W.	Capt.
Cascade	Thiel, Leslie D.	Capt.
Orofino	Kinney, Robert J.	Capt.
Pocatello	Clawson, John R.	Maj.

Illinois

Atwood	Quackenbush, C. L.	Capt.
Aurora	Reiger, Maurice A.	Lieut.
Belvidere	Martin, Daniel J.	Capt.
Berwyn	Reichert, Ralph C.	Maj.
Cambridge	Johnson, Kenneth R.	Maj.
Champaign	Smith, Robert F.	Capt.
Chicago	Aronoff, Sidney	Lieut.
Chicago	Blechman, M.	Capt.
Chicago	Bobrow, Joseph B.	Capt.
Chicago	Callahan, Eugene J.	Capt.
Chicago	Carnes, Andrew B.	Capt.
Chicago	Christopher, Frank R.	Maj.
Chicago	Elder, Thomas C.	Maj.
Chicago	Feldman, Max L.	Capt.
Chicago	Gigante, Leonard L.	Capt.
Chicago	Gillotte, Anthony	Capt.
Chicago	Glick, Leo L.	Capt.
Chicago	Gold, Henry O.	Capt.
Chicago	Haberline, George W.	Capt.
Chicago	Heffner, Donald J.	Capt.
Chicago	Hertzberg, Melvin D.	Capt.
Chicago	Holm, Herbert H.	Capt.
Chicago	Ischinger, Arthur M.	Capt.
Chicago	Karr, Walter M.	Capt.
Chicago	Klein, Arthur D., Jr.	Capt.
Chicago	Kollar, John A., Jr.	Capt.
Chicago	Kula, Edward J.	Capt.
Chicago	Levadi, Solomon S.	Maj.
Chicago	Link, Harold J.	Capt.
Chicago	Losoff, Isadore	Capt.
Chicago	McKee, Victor J.	Capt.
Chicago	Mathews, Henry J.	Capt.
Chicago	Miles, Elmus E.	Capt.
Chicago	Miller, Seymour F.	Capt.
Chicago	Moses, Norman L.	Capt.
Chicago	Motew, Max M.	Capt.
Chicago	Munson, Leonard H.	Capt.
Chicago	Naselli, George E.	Capt.
Chicago	Parrilli, George W.	Capt.
Chicago	Peters, Eugene	Capt.
Chicago	Rasqui, George P.	Capt.
Chicago	Ringa, Edwin C.	Capt.
Chicago	Rollo, James S.	Capt.
Chicago	Schanda, Edward A.	Capt.
Chicago	Schuenman, Arthur H.	Capt.
Chicago	Stecker, Edward F.	Maj.

Chicago	Steinman, Bernard J.	Capt.
Chicago	Styburski, George E.	Capt.
Chicago	Szczepanski, Edward J.	Capt.
Chicago	Uditsky, Emanuel D.	Capt.
Chicago	Warzak, Lauren J.	Capt.
Chicago	Weber, Harry F.	Maj.
Chicago	Zapolsky, Sam	Capt.
Collinsville	Kraft, William E.	Capt.
Evanston	Knickels, Ashton E.	Capt.
Evanston	Meining, Douglas A.	Capt.
Flora	McDonald, Edward J.	Capt.
Freeport	Brookstra, Marvin E.	Capt.
Girard	McKemie, Thomas R.	Capt.
Granite City	Hill, Maurice R.	Capt.
Hoyleton	Kasten, Roy F.	Capt.
Joliet	Seron, Suren M.	Capt.
Litchfield	Mansfield, Frank S.	Capt.
Pana	Bernardi, Ernest R.	Capt.
Peoria	Bloom, Max E.	Capt.
Peoria	Peters, Wallace M.	Capt.
Plano	Allen, Robert W.	Capt.
River Forest	Pagano, Aurelius J.	Capt.
Riverside	Wagner, Otto C.	Maj.
Rock Island	Steck, Benn A.	Capt.
St. Louis	Bloemer, William J.	Capt.
Savanna	Wolfe, Donald S.	Capt.
	Indiana	
Bicknell	Heidenreich, John L.	Capt.
Brazil	Shaw, Marion A.	Capt.
Elkhart	Eastman, Ralph C.	Maj.
Evansville	Freund, David F.	Capt.
Evansville	Kopelowitz, Robert B.	Capt.
Evansville	Schafer, Edward T.	Capt.
Frankfort	Hammersley, W. L.	Capt.
Gary	Levinston, Francisco F.	Maj.
Hobart	Siegesmund, K. W.	Capt.
Indianapolis	Cohen, Cecil S.	Capt.
Indianapolis	Herman, Saul	Capt.
Indianapolis	Hohlt, Fredrick A.	Capt.
Indianapolis	Linck, George A.	Capt.
Indianapolis	Pierce, Doyle E.	Capt.
Indianapolis	Sacks, LeRoy F.	Capt.
Muncie	Topf, Arthur G.	Capt.
New Castle	Leavell, Fred W.	Capt.
Valparaiso	Zimmerman, James C.	Capt.
Whiting	Kosior, Edward F.	Lieut.
	Iowa	
Ames	Ukena, Maynard A.	Capt.
Burlington	Hahn, Philip A.	Capt.
Centerville	Davis, Bruce P.	Capt.
Clarinda	Peterson, Paul A.	Capt.
Council Bluffs	Ambrose, John M.	Capt.
Des Moines	Boland, James M.	Capt.
Des Moines	Ehrhart, Clyde L., Jr.	Capt.
Des Moines	Grund, Carl C.	Capt.
Des Moines	Marshman, George F.	Capt.
Des Moines	Watters, Hugh S.	Capt.
Eldora	Burke, Eldon W.	Maj.
Exira	James, Ernest G.	Capt.
Greenfield	Arts, Joseph B.	Capt.
Iowa City	Cordes, Theodore C.	Capt.
Iowa City	Kasemer, Andrew G.	Capt.
Keokuk	Sinotte, Wells M.	Capt.
Mason City	Mooney, Samuel C.	Capt.
Mondamin	Klutts, Harlan F.	Maj.
New Sharon	Koke, Raymond O.	Maj.
Remsen	Sievers, Linden H.	Lieut.
Sioux City	Epstein, Frank	Capt.
Sioux City	Jones, Eveton	Capt.
Waterloo	Shaw, Frank H.	Capt.
	Kansas	
Beloit	Holle, Lloyd F.	Capt.
Coffeyville	Clark, Paul E.	Capt.
Colby	Mullinax, Eli H.	Capt.
Coldwater	Schulz, Herman S.	Capt.
Goodland	Hirsch, Norris F.	Capt.
Greenleaf	Anderson, Seth E.	Capt.
Hays	Wilson, Clair J.	Maj.
McCracken	Spomer, William A.	Capt.
Mission	Evans, Ray G.	Maj.
Moran	Browning, Warren C.	Capt.
Moran	Johnson, Howard B.	Capt.
Overland Park	Cross, Gordon W.	Capt.
Wichita	Benton, James V.	Capt.
Wichita	Morgan, George E.	Capt.
Wichita	Schanta, Lee R.	Lt. Col.
	Kentucky	
Beattyville	Bowles, William S.	Capt.
Bellevue	Broering, Leo J.	Capt.
Buechel	Miller, Charles D.	Capt.
Danville	Cocanougher, C. H.	Capt.
Jackson	Needham, William T.	Lieut.
Jackson	Quinlan, Arthur E.	Capt.
Louisville	Hall, Robert L.	Capt.
Manchester	Jordan, Charles C.	Capt.
Outwood	Nixon, James W.	Capt.
Paducah	Bichon, Marion T.	Capt.
	Louisiana	
Alexandria	Baker, Dewitt T.	Maj.
Arnaudville	Sagrera, Walter T.	Capt.
Baton Rouge	McKay, Waller K., Jr.	Capt.
Independence	Vaccaro, John V.	Maj.
Mansura	Bergeron, R. P., Jr.	Capt.
Monroe	Kendalle, Will S.	Capt.
New Orleans	Barthelemy, Clyde G.	Capt.
New Orleans	Cerise, Paul A., Jr.	Capt.
New Orleans	Perdue, Ervil L.	Capt.
New Orleans	Richard, Euclid L.	Maj.
New Orleans	Tamburo, Joseph J.	Lieut.
New Orleans	Walder, Sam	Capt.
New Orleans	Whitley, Andrew R.	Capt.
Shreveport	Zaffater, Joseph W.	Capt.
	Maryland	
Baltimore	Askins, Clifford F.	Capt.
Baltimore	Caplan, Sylvan	Capt.
Baltimore	Goldiner, Morton J.	Capt.
Baltimore	Gordon, Ralph J.	Capt.
Baltimore	Haynes, Frank P., Jr.	Capt.
Baltimore	Paskell, Ray S.	Lieut.
Baltimore	Pessagno, E. L., Jr.	Capt.
Baltimore	Spellman, James P.	Maj.
Baltimore	Stepan, Jerry J.	Capt.
Baltimore	Stinebert, Edward R.	Lieut.
Baltimore	Varipatis, Michael S.	Capt.
Bethesda	Lanier, William D.	Maj.
Brunswick	Orrison, Richard C.	Capt.
Cambridge	Smith, Russell P., Jr.	Capt.
Chevy Chase	Linton, Frank T., Jr.	Capt.
Cumberland	Zwick, Sidney	Capt.
Lansdowne	Brown, Frank A.	Capt.
Raspeburg	Rudo, Frederick B.	Capt.
Takoma	Artress, Henry E.	Maj.

Massachusetts

Adams	Ouellette, Gerard L.	Lieut.
Boston	Anderson, Lorin L.	Lieut.
Brockton	Weston, Henry F.	Col.
Cambridge	Menicks, Samuel Y.	Lieut.
Chicopee Falls	Praisner, Peter L.	Capt.
Dorchester	Kurlansky, Philip M.	Capt.
Fall River	Carvalho, John C.	Capt.
Fitchburg	Ross, Alfred D.	Capt.
Holyoke	Saltman, David	Capt.
Marlboro	Paglia, Francis R.	Capt.
Milford	Andreotti, Hugo A.	Capt.
New Bedford	Kisner, Samuel	Capt.
Newton Highl'ds	Parker, Charles C.	Capt.
Pittsfield	Byrnes, John J.	Capt.
Quincy	Gallahue, Stephen C.	Capt.
Quincy	Kurtzman, Hyman R.	Capt.
Revere	Bly, Harold W.	Capt.
Roxbury	Glickstein, Milton L.	Capt.
Roxbury	Massell, Eli	Lieut.
Shrewsbury	Trumble, John E.	Capt.
Somerville	Nahigian, Albert M.	Capt.
Springfield	Megas, Takis J.	Capt.
Swampscott	Levites, Irving	Capt.
Westborough	Griffin, Gerald D.	Capt.
West Roxbury	Birkrem, Alf B.	Capt.
Winthrop	Shapiro, Joseph J.	Capt.
Woburn	Altavesta, Albert A.	Capt.
Wollaston	Rollins, Fred G.	Maj.

Michigan

Addison	Peck, Milan H.	Capt.
Ann Arbor	Hellman, Donald L.	Capt.
Ann Arbor	Marceau, J. E., Jr.	Capt.
Cadillac	Ardis, Charles R.	Capt.
Cadillac	Mosberg, Carl E.	Capt.
Charlevoix	Pisani, Raymond A.	Capt.
Coldwater	Shorno, Donald V.	Capt.
Detroit	Adams, Charles W.	Capt.
Detroit	Barbour, Edmund N.	Capt.
Detroit	Carpenter, Nyal J.	Capt.
Detroit	Cattelle, Charles M.	Capt.
Detroit	Dunmire, Justin H., Jr.	Capt.
Detroit	Kutnick, Jack D.	Lieut.
Detroit	Muller, Harry	Lieut.
Detroit	Nelson, Carl M.	Capt.
Detroit	Pearl, Robert D.	Lieut.
Detroit	Robertson, George D.	Lieut.
Detroit	Sibilsky, George A.	Capt.
Detroit	Simon, Donald A.	Lieut.
Detroit	Starman, Jack D.	Capt.
Fenton	Peckham, R. Noble	Capt.
Flint	Blinn, Simeon	Lieut.
Flint	Norton, Harry M.	Capt.
Fort Custer	Vickery, Arthur L.	Capt.
Grand Haven	Norcross, Clifford L.	Capt.
Grand Rapids	Feldman, David	Capt.
Grand Rapids	Hess, Thomas L.	Capt.
Grand Rapids	Oleson, Wilbur E.	Capt.
Hamtramck	Narkun, Walter J.	Capt.
Houghton	Aldrich, John M.	Capt.
Huntington Wds.	Thomas, Cornelius J.	Capt.
Kalamazoo	Snyder, Roscoe F., Jr.	Maj.
Lansing	Bills, Donald G.	Capt.
Lansing	Jones, Robert M.	Capt.
Pentwater	Patterson, Roy Z.	Capt.
Pentwater	Taylor, Norman H.	Capt.
Pontiac	Lodeesen, Rudolph	Capt.
Sandusky	Hemerick, Frederick A.	Maj.
Sebewaing	Kessler, Morris B.	Capt.

Minnesota

Annandale	Peterson, Donald P.	Capt.
Detroit Lakes	Olson, Emerald G.	Capt.
Duluth	Johnson, Carl G.	Maj.
Duluth	Walker, Donald F.	Maj.
Ely	Kalan, Rudolph J.	Capt.
Emmons	Johnson, Elmer M.	Capt.
Fairmont	Krause, Lyndon S.	Capt.
Fergus Falls	Lee, Winston L.	Maj.
Forest Lake	Anderson, Olof H.	Capt.
Gilbert	Erickson, Walter W.	Maj.
Glencoe	Ressler, Walter A.	Capt.
Minneapolis	Erdmann, Louis E.	Capt.
Minneapolis	Mardell, Raymond M.	Capt.
Minneapolis	Mitchell, James R.	Capt.
Minneapolis	Mona, Joseph O.	Capt.
Minneapolis	Neill, Chester H.	Capt.
Minneapolis	Schoening, Harry M.	Capt.
Minneapolis	Simmons, Knute N.	Capt.
Minneapolis	Toles, Simon	Capt.
Minneota	Schulte, John M.	Capt.
Roseau	Robertson, James C.	Lieut.
St. Paul	Brewer, Nicholas R.	Capt.
St. Paul	McQuillan, Herbert A.	Capt.
St. Paul	Mushkatin, Max H.	Maj.
St. Paul	Polski, Emory H.	Lieut.
St. Paul	Wehrle, Robert G.	Capt.
St. Peter	Dahleen, Robert C.	Maj.
St. Peter	Kaisersatt, Stanley J.	Capt.
Shakopee	Huber, Joseph C.	Capt.
Spring Valley	LaDue, Marcus N.	Capt.
Welcome	Theissen, Erwin F.	Lieut.
Wheaton	Weickert, Harold N.	Maj.
Willmar	Gerretson, Douglas H.	Capt.
Windom	Lester, Gordon J.	Capt.

Mississippi

Biloxi	Pitalo, Stephen	Capt.
Gulfport	Harper, John W.	Capt.
Hattiesburg	Askew, J. W., Jr.	Maj.
Hattiesburg	Williams, Max	Maj.
Ruleville	Tolbert, Earl P.	Capt.

Missouri

Caruthersville	Lempert, David	Capt.
Crystal City	Martin, Ira D.	Maj.
Elsberry	Wilson, Gion G.	Maj.
Genevieve	Lanning, Glennon O.	Maj.
Harrisonville	Sell, James B.	Maj.
Kansas City	Bartlett, Harry D.	Capt.
Kansas City	Black, Charles K.	Lieut.
Kansas City	Hamilton, Ruford B.	Maj.
Kansas City	Nelson, Edward P.	Capt.
Kansas City	Purcell, Thomas E.	Capt.
Kansas City	Stivers, Volney C.	Maj.
Lamar	Reavley, Jack W., Jr.	Capt.
Overland	Hamilton, William J.	Capt.
St. Charles	Moore, Vance N.	Capt.
St. Louis	Anton, Jack J.	Capt.
St. Louis	Barrett, Daniel S.	Capt.
St. Louis	Dimitrove, John C.	Capt.
St. Louis	Lang, Tobias R.	Maj.
St. Louis	Matsakis, Nicholas D.	Capt.
St. Louis	Zacher, Arthur F.	Capt.

Slater	Herider, Harry V.	Maj.
Springfield	Kingery, Daniel R.	Maj.
Springfield	Moist, Richard E.	Lieut.

Montana

Butte	Montgomery, Lee E.	Capt.
Hamilton	O'Connell, Thomas J.	Capt.
Livingston	Betzner, Robert O.	Capt.
Ronan	Raye, Stanley C.	Capt.
Sidney	Sanford, Avery R.	Capt.

Nebraska

Cairo	Dodd, Daniel E.	Capt.
Calaway	Ridder, Albert T.	Maj.
Crawford	Morgan, Alfred W.	Capt.
Crete	Gerner, Clarence J.	Capt.
Grand Island	Plith, Arthur R.	Capt.
Leigh	Filipi, Edward F.	Maj.
Lincoln	Davie, Fred G.	Capt.
Neligh	Steffl, Leo D.	Capt.
North Platte	Eurich, Roy	Capt.
Omaha	Drdla, George	Capt.
Omaha	Grady, Chris J.	Capt.
Omaha	Hart, Donald S.	Capt.
Omaha	Kadavy, Godfrey D.	Capt.
Omaha	O'Brien, John R.	Lt. Col.
Omaha	Schmidtmann, G. A.	Maj.
Omaha	Stahn, Jack R.	Capt.
Stanton	Mielenz, Dwight L.	Capt.

New Jersey

Amboy	Madura, Paul P.	Capt.
Bayonne	Kohn, Arthur A.	Capt.
Bayonne	Shulman, Charles	Capt.
Belleville	Rich, William	Lt. Col.
Bound Brook	Levy, Milton A.	Capt.
Camden	Reiter, Frank L.	Lieut.
Cranford	Reusch, George	Capt.
East Orange	Herman, Alan H.	Capt.
Elizabeth	Triarsi, James L.	Capt.
Elizabeth	Weiss, Leo G.	Capt.
Irvington	Ogens, Walter I.	Capt.
Jersey City	Goldstein, Meyer H.	Capt.
Jersey City	Hyman, Seymour G.	Capt.
Jersey City	McLean, Robert R.	Capt.
Jersey City	Tyler, Sidney A.	Maj.
Madison	McBride, Robert H.	Capt.
Manville	Chasens, Abram I.	Capt.
Newark	Krugman, George	Capt.
Newark	Price, Samuel J.	Maj.
Newark	Rubin, Louis	Maj.
Newark	Silverman, Jacob B.	Maj.
Newark	Sosnow, David	Capt.
Newark	Spinner, Alexander J.	Capt.
Oradell	Sherwood, Frank W.	Capt.
Orange	Harper, William T.	Capt.
Passaic	Cohen, Jacob J.	Capt.
Passaic	Stern, Martin	Capt.
Paterson	Cobell, Anthony J.	Capt.
Paterson	Tannenbaum, E. E.	Capt.
Perth Amboy	Roth, Alexander R.	Maj.
Plainfield	Harris, Norman R.	Maj.
Plainfield	Siccardi, Louis F.	Capt.
Red Bank	Swartz, Lester R.	Lieut.
Riverside	Dudley, Walter C.	Capt.
Roebling	Dimon, Edward J.	Capt.
Summit	Pizzo, Arthur P.	Capt.
Swedesboro	Patterson, Samuel L.	Capt.
Teaneck	Hoffman, Jules M.	Capt.
Weehawken	Levine, Alexander	Capt.
Weehawken	Rogler, Wesley E.	Capt.
Woodridge	Young, Robert W.	Lieut.
Woodstown	Timmins, William D.	Capt.

New Mexico

Alamogordo	Robertson, B. H.	Capt.
Las Vegas	Voda, Isadore L.	Lieut.

New York

Albany	Cleary, Paul T.	Capt.
Albany	Halloran, Robert D.	Capt.
Amsterdam	Skodinski, E. R.	Capt.
Auburn	Lesch, Gerard A.	Capt.
Auburn	Nolan, Paul J.	Capt.
Baldwin	Roistacher, David H.	Maj.
Bellmore	Elkind, Samuel L.	Capt.
Binghamton	Wilbur, Ivan D.	Capt.
Bronx	Altman, Martin	Capt.
Bronx	Berger, Sol	Capt.
Bronx	Bornstein, Louis	Capt.
Bronx	Friedman, Lester	Capt.
Bronx	Kimmelman, M. M.	Capt.
Bronx	Langstein, David A.	Lieut.
Bronx	Mirchin, Bernard I.	Capt.
Bronx	Mitteldorf, Morton W.	Capt.
Bronx	Moses, Sidney	Capt.
Bronx	Novik, Abraham	Capt.
Bronx	Orkin, Judah M.	Capt.
Bronx	Reif, Nathan	Capt.
Bronx	Rubin, David	Capt.
Bronx	Skolnick, Irving M.	Capt.
Bronx	Talmadge, Jacob A.	Capt.
Bronx	Unger, Morris D.	Capt.
Bronx	Weinberg, Jack R.	Capt.
Brooklyn	Argentieri, G. W.	Capt.
Brooklyn	Auerbach, Samuel	Capt.
Brooklyn	Berliner, Abraham	Capt.
Brooklyn	Bernstein, Morton E.	Capt.
Brooklyn	Bernstein, Solomon	Capt.
Brooklyn	Berson, Emanuel D.	Lieut.
Brooklyn	Binder, Herbert	Lieut.
Brooklyn	Bucalo, Anthony J.	Capt.
Brooklyn	Cirrito, Sebastian E.	Capt.
Brooklyn	Cohen, Seymour D.	Capt.
Brooklyn	Dragiff, David A.	Capt.
Brooklyn	Dreishpoom, Irving	Capt.
Brooklyn	Edelson, Allen A.	Capt.
Brooklyn	Fels, Irving	Capt.
Brooklyn	Gingold, Sol	Capt.
Brooklyn	Glaseroff, Daniel	Capt.
Brooklyn	Glatman, Gabriel	Capt.
Brooklyn	Goldberg, Ben M.	Lieut.
Brooklyn	Goldin, Oscar L.	Capt.
Brooklyn	Gordon, Max	Capt.
Brooklyn	Gottlieb, Allan W.	Capt.
Brooklyn	Greco, Joseph R.	Lieut.
Brooklyn	Greene, Philip R.	Lieut.
Brooklyn	Gruskin, Samuel	Capt.
Brooklyn	Guagliano, A. V.	Capt.
Brooklyn	Ingber, George L.	Capt.
Brooklyn	Kabat, Irving C.	Capt.
Brooklyn	Kantor, Mortimer	Capt.
Brooklyn	Karsdon, Arthur	Lieut.
Brooklyn	Katz, Lester	Capt.
Brooklyn	Klang, Paul J.	Lieut.

Brooklyn	Kritchman, Louis	Capt.	Fulton	Mehegan, Vincent J.	Capt.
Brooklyn	Leavitt, Joseph M.	Capt.	Great Neck	Fishman, Stanley J.	Capt.
Brooklyn	Lefkowitz, David	Capt.	Jackson Heights	Brown, Alexander	Capt.
Brooklyn	Lerner, Eugene G.	Capt.	Jackson Heights	Doob, William A.	Capt.
Brooklyn	Margolies, Nathan	Capt.	Jackson Heights	Taynor, Irving K.	Capt.
Brooklyn	Mehlman, Charles	Capt.	Jackson Heights	Weiner, Morris A.	Capt.
Brooklyn	Monheit, Leo	Lieut.	Jamaica	Taub, Herbert L.	Capt.
Brooklyn	Monosam, David D.	Maj.	Jamestown	Spiegel, Louis	Capt.
Brooklyn	Pearlman, Leonard M.	Capt.	Kew Gardens	Josephs, Eugene S.	Capt.
Brooklyn	Pearlman, William I.	Maj.	Kew Gardens	Winston, Jack	Capt.
Brooklyn	Plust, Morris	Capt.	LeRoy	Scott, Joseph D.	Capt.
Brooklyn	Polishuk, Julius	Lieut.	Lockport	Downes, Chester G.	Capt.
Brooklyn	Pompa, Rocco L.	Capt.	Lockport	Moyer, William R.	Capt.
Brooklyn	Preiss, Emanuel	Lieut.	Long Island	Giurtino, Francis J.	Capt.
Brooklyn	Reiser, Irving A.	Capt.	Long Island	Gluckman, Herman J.	Capt.
Brooklyn	Reison, Bernard	Capt.	Long Island	Kohout, John J.	Capt.
Brooklyn	Rosenbush, Joseph	Capt.	Lowe	Schoenbaum, B. R.	Capt.
Brooklyn	Ross, Bertram	Capt.	Madina	Thiel, Norman E.	Capt.
Brooklvn	Roth, George	Capt.	Maspeth	Antell, Nathan	Capt.
Brooklyn	Saffro, Isidore	Capt.	Middletown	DiBello, Anthony J.	Lieut.
Brooklyn	Scheer, William B.	Lieut.	Mt. Vernon	Leff, Michael W.	Capt.
Brooklyn	Schoenfeld, Albert	Capt.	Mt. Vernon	Lempert, Leonard	Capt.
Brooklyn	Schonfeld, Isaac	Capt.	Mt. Vernon	Zibelli, Joseph J.	Maj.
Brooklyn	Schwimmer, Irving S.	Capt.	Newburgh	Weiss, Harold A.	Capt.
Brooklyn	Segal, Martin L.	Capt.	New Rochelle	James, Henry	Capt.
Brooklyn	Shea, Adolph B.	Capt.	New York	Abrams, Irving J.	Capt.
Brooklyn	Shiff, Harry P.	Capt.	New York	Abramson, Irving	Capt.
Brooklyn	Siegel, Samuel R.	Capt.	New York	Alderisio, James P.	Capt.
Brooklyn	Silverstein, Philip	Capt.	New York	Bergstein, Hyman A.	Capt.
Brooklyn	Singer, Norman	Maj.	New York	Birn, Nathan	Capt.
Brooklyn	Sobin, Irwin	Capt.	New York	Blumenthal, Joseph	Capt.
Brooklyn	Soroka, Milton	Capt.	New York	Borkin, Daniel W.	Capt.
Brooklyn	Spagna, Rochard	Capt.	New York	Canter, Harold J.	Capt.
Brooklyn	Stein, Joseph B.	Capt.	New York	Cipes, Paul L.	Capt.
Brooklyn	Stein, Martin	Capt.	New York	Cohen, Jacob	Lieut.
Brooklyn	Sternlight, Harold C.	Capt.	New York	Donson, Samuel D.	Capt.
Brooklyn	Stoll, Leo	Capt.	New York	Esan, Avrum	Capt.
Brooklyn	Strauss, Seymour R.	Capt.	New York	Ettinger, Abraham	Capt.
Brooklyn	Strenger, Aaron L.	Capt.	New York	Feinsilver, Joseph	Lieut.
Brooklyn	Sussman, Harold	Capt.	New York	Freilich, Jacob	Lieut.
Brooklyn	Teichberg, Aaron	Capt.	New York	Gershater, Maurice M.	Capt.
Brooklyn	Umans, Robert	Capt.	New York	Goldberg, Frederick	Capt.
Brooklyn	Warren, Morris	Capt.	New York	Goldberg, Isadore R.	Capt.
Brooklyn	Weinberg, Albert K.	Capt.	New York	Goldberg, Morris	Capt.
Brooklyn	Weiner, Jacob	Capt.	New York	Harrigan, William F.	Maj.
Brooklyn	Wolf, Raymond D.	Capt.	New York	Heilgman, Sol J.	Capt.
Brooklyn	Yachnes, Harold	Capt.	New York	Heiman, Lawrence	Capt.
Buffalo	Bikoff, Herbert L.	Capt.	New York	Kahn, Arthur E.	Capt.
Buffalo	Nowak, Joseph L.	Capt.	New York	Kislowitz, Joseph	Lieut.
Buffalo	Pritchard, Alan S.	Capt.	New York	Klein, Ira E.	Capt.
Buffalo	Ruszaj, Eugene M.	Capt.	New York	Knopf, Robert F.	Capt.
Buffalo	Slepowronski, B. J.	Lieut.	New York	Koppelman, Seymour	Capt.
Catskill	Brown, David P.	Capt.	New York	Lipeles, Max	Capt.
Catskill	Fried, Stanford	Maj.	New York	Margolies, William I.	Capt.
Chenango	Kerley, John K.	Capt.	New York	Martusciello, M. S.	Lieut.
Corona	Quaranta, Alfred J.	Capt.	New York	Melnick, Sidney	Capt.
East Bronx	Buchstein, Nathan	Capt.	New York	Meyerson, Israel M.	Capt.
Falconer	Moller, Edward B.	Capt.	New York	Morris, Melvin L.	Capt.
Far Rockaway	Goldberg, Donald S.	Capt.	New York	Morse, Alexander W.	Capt.
Far Rockaway	Greenfield, Samuel	Capt.	New York	Moss, Paul J.	Capt.
Forest Hills	Croft, Sanford R.	Lieut.	New York	Nash, Edgar	Capt.
Forest Hills	Getz, Edwin H.	Capt.	New York	Nisonoff, Robert	Capt.
Forest Hills	Loth, Arnold	Capt.	New York	Orden, Charles Q.	Capt.
Forest Hills	Schwartz, Seymour W.	Capt.	New York	Pinn, Noah N.	Capt.
Forest Hills	Spero, Sidney	Capt.	New York	Polivy, Sidney M.	Capt.
Fredonia	Pasquale, Frank A.	Lieut.	New York	Reich, Herman	Capt.
Freeport	Bloom, Philip	Capt.	New York	Reiner, Abraham	Capt.
Friendship	Behringer, Norbert J.	Capt.	New York	Reisender, Samuel I.	Capt.

New York	Remer, Irving	Capt.
New York	Rubin, Philip L.	Lieut.
New York	Saxon, Alfred E.	Lieut.
New York	Schacter, Stanley	Capt.
New York	Schneider, Ralph	Capt.
New York	Schoenberg, Philip	Capt.
New York	Schwartz, Irving	Capt.
New York	Schwartz, Isidore R.	Capt.
New York	Shapiro, Leonard B.	Capt.
New York	Shapiro, Nathan A.	Lieut.
New York	Shilkret, Robert T.	Capt.
New York	Solomon, Arnold A.	Capt.
New York	Stillman, Raymond E.	Capt.
New York	Strickler, William O.	Capt.
New York	Sussman, Isidore I. J.	Capt.
New York	Tasch, Ralph J.	Capt.
New York	Trabman, Hyman	Capt.
New York	Wadler, Irwin M.	Lieut.
New York	Weber, Robert F.	Capt.
New York	Winkelman, Bernard	Capt.
New York	Winston, Philip A.	Capt.
New York	Wohlberg, Claude L.	Capt.
New York	Wong, Leroy L.	Capt.
Olean	Dudley, William W.	Capt.
Ossining	McDowell, Joseph L.	Capt.
Pittsford	Carlson, Glen W.	Capt.
Poughkeepsie	Solomon, Sheldon J.	Capt.
Rensselaer	Wallace, Donald F.	Capt.
Rochester	Dormire, Robert B.	Capt.
Rochester	Greenberg, Orrin	Capt.
Rochester	Lisanti, Vincent F.	Capt.
Rochester	McHugh, Joseph W.	Capt.
Rochester	Miller, George I.	Capt.
Rochester	Wylegala, Henry O.	Capt.
Rockaway Beach	Jacobs, Robert A.	Capt.
Saranac Lake	Farrington, Jackson G.	Capt.
Schenectady	Wedekind, Walter R.	Capt.
Snyder	Voss, William F.	Capt.
Staten Island	Galer, Samuel	Lieut.
Staten Island	Schwartz, Jordan H.	Capt.
Staten Island	Sherman, Seymour	Capt.
Syracuse	Anderson, Thomas A.	Capt.
Syracuse	Feinstein, Irving	Capt.
Syracuse	Hayes, William J.	Capt.
Ticonderoga	Bowers, Karl J.	Lieut.
Tonawanda	Johnston, Robert W.	Capt.
Trumansburg	Smith, Carl R.	Capt.
Warwick	Beattie, John D., Jr.	Capt.
White Plains	Liebman, Theodore	Capt.
White Plains	Sablow, Lester H.	Capt.
White Plains	Weeth, Byron H.	Capt.
Williston Park	Gilmore, Samuel J.	Capt.
Yonkers	Pellettiere, Leon F.	Capt.

North Carolina

Canton	Hargrove, William F.	Capt.
Chapel Hill	Pleasants, John E.	Maj.
Coats	Roberts, Clarence E.	Capt.
Fayetteville	Lindsay, Worrell K.	Capt.
Lincolnton	Harrill, Charlie H.	Lt. Col.
Mooresville	Overcash, Robert F.	Capt.
Newton	Isenhower, Samuel H.	Capt.
Oteen	Archer, Isaac H.	Maj.
Rocky Mount	Young, Henry L.	Capt.
Winston-Salem	Spoon, Riley E.	Capt.

North Dakota

Fargo	Naftalin, Arnold M.	Capt.
Fargo	Sand, Russell A.	Lt. Col.
Jamestown	Keltgen, Victor B.	Capt.
Minot	Hartl, James F.	Capt.
Park River	Jaehning, Julius V.	Capt.

Ohio

Bellefontaine	Asman, Harold G.	Capt.
Bucyrus	Fisher, Lester L.	Capt.
Bucyrus	Marquart, Robert L.	Capt.
Canton	Beatty, Dudley M.	Capt.
Clairsville	Sibley, Gerald W.	Maj.
Cleveland	Iden, Eugene D.	Capt.
Cleveland	Karow, Joseph J.	Maj.
Cleveland	Kashian, Setrak J.	Capt.
Cleveland	Klein, Alfred	Capt.
Cleveland	L'Orange, Finn F.	Capt.
Cleveland	Mintz, Simon L.	Capt.
Cleveland	Osolin, Alfred J.	Capt.
Cleveland Hts.	Castrigano, Vincent D.	Capt.
Cleveland Hts.	Vincour, Samuel A.	Capt.
Columbus	Bernhard, Joel G.	Capt.
Columbus	King, Than R.	Maj.
Columbus	Oldham, Rowland E.	Lt. Col.
Columbus	Palestrant, Jack S.	Capt.
Columbus	Voss, Harold E.	Capt.
Dayton	Mathiott, George S.	Capt.
Dayton	Rubin, Gerald N.	Capt.
Dayton	Trent, Ralph W.	Lt. Col.
Greenfield	Pinkerton, Paul W.	Capt.
Greenville	Cole, Jeffries G.	Capt.
Liverpool	Alpern, Myer	Maj.
Lorain	Ray, Horace C.	Capt.
Marion	Sheehe, Carl A.	Capt.
Miamisburg	Luburgh, Homer M.	Maj.
Mt. Vernon	Minnich, John F.	Capt.
North Baltimore	Calderhead, W. A.	Capt.
Ravenna	Harvey, Ernest W.	Lieut.
Shaker Heights	Breuer, Gerold B.	Capt.
Silverton	Oettinger, Murr R.	Capt.
Strasburg	Smith, Ralph S.	Capt.
Toledo	Werrell, Francis H.	Capt.
Washington C.H.	Nauss, Ray J.	Capt.
Westlake	Nitsch, Louis E.	Capt.
Youngstown	Phillips, Frank K.	Capt.
Youngstown	Price, Robert W.	Capt.

Oklahoma

Broken Arrow	Cunningham, Earle R.	Capt.
Holdenville	McLarty, Todd	Capt.

Oregon

Dallas	Ott, William A.	Lieut.
Klamath Falls	Goehring, David H.	Capt.
Portland	Brandon, Robert B.	Capt.
Portland	Cartozian, Ardash T.	Capt.
Portland	Fisher, Melvin L.	Capt.
Portland	Moore, Anthony W.	Capt.
Portland	Musick, Max D.	Capt.
Portland	Parker, Robert S.	Capt.
Portland	Stenger, Robert C.	Capt.
Portland	Stephens, Paul H.	Capt.
Portland	Weider, Jonah D	Capt.
Portland	Zetin, Morris M.	Capt.
Salem	Burger, Paul E.	Capt.
Salem	Parker, William S.	Capt.

Pennsylvania

Allentown	Lavine, Samuel	Lieut.

Altoona	Pearce, Robert L.	Capt.
Ashland	Shuttlesworth, W. C.	Capt.
Avoca	Kane, Joseph J.	Capt.
Beaver Falls	Steinberg, Henry	Lieut.
Berwyn	Boyle, James G., Jr.	Capt.
California	Latta, Lowman R.	Capt.
Carmel	Menapace, Francis J.	Capt.
Clarion	Harbaugh, Paul W.	Capt.
Conshohocken	Katz, David D.	Lieut.
Dallastown	Miller, Robert M.	Capt.
Dunmore	Kelly, James B.	Capt.
Dupont	Kozlowski, Charles A.	Capt.
Easton	McCarthy, Thomas J.	Capt.
Edwardsville	Payavis, Leo P.	Capt.
Elkins Park	Lenz, Morris L.	Capt.
Erie	Stanczak, Stephen S.	Capt.
Ford City	Pechan, Albert R.	Capt.
Freeland	Hoch, Malcolm S.	Maj.
Gettysburg	Cannizzaro, A. B.	Capt.
Hanover	Hoffacker, Henry J.	Capt.
Hawley	Gummoe, Robert G.	Capt.
Jenkintown	Metz, Leon D.	Capt.
Johnstown	Mikesic, Joseph J.	Capt.
Johnstown	Slick, Robert C.	Capt.
Lansdale	McIntyre, Joseph H.	Capt.
Lansford	Petrosky, Alfonso M.	Capt.
Lansford	Sirak, John A.	Capt.
Ligonier	Kline, Lewis E.	Capt.
Lock Haven	Jusick, John E.	Capt.
Mahanoy City	Walinchus, William P.	Capt.
Monongahela	McCallister, W. C.	Capt.
New Castle	Lutz, Raymond C.	Maj.
Northampton	Moritz, Charles F.	Capt.
Northumberland	Davis, James H.	Capt.
Penbrook	Thompson, John R.	Maj.
Philadelphia	Adelizzi, Francis M.	Capt.
Philadelphia	Bahoff, Sheldon G.	Capt.
Philadelphia	Beresin, Victor E.	Capt.
Philadelphia	Bernstein, Herbert M.	Capt.
Philadelphia	Birschtein, Benjamin	Capt.
Philadelphia	Chess, Metkin	Capt.
Philadelphia	Colborn, John W.	Capt.
Philadelphia	Cotler, Abraham	Capt.
Philadelphia	Goldberg, Barnett	Capt.
Philadelphia	Kaye, Milton H.	Lieut.
Philadelphia	Korman, Jack Z.	Capt.
Philadelphia	Kredo, Albert H.	Lieut.
Philadelphia	Liebman, Manuel	Capt.
Philadelphia	Lubar, David	Capt.
Philadelphia	Lucchesi, Fred J.	Capt.
Philadelphia	McGinniss, J. F. X.	Capt.
Philadelphia	Malmaud, Morris M.	Capt.
Philadelphia	Mandell, Edwin J.	Maj.
Philadelphia	Markovitz, Harry	Capt.
Philadelphia	Mervine, Lawrence L.	Capt.
Philadelphia	Mervine, Samuel S.	Lt. Col.
Philadelphia	Mickunas, Albert P.	Capt.
Philadelphia	Mitchell, Theodore	Capt.
Philadelphia	Moser, Ernest H.	Maj.
Philadelphia	Nathanson, Israel	Lieut.
Philadelphia	Nise, Jack I.	Capt.
Philadelphia	Oltman, Jacob	Capt.
Philadelphia	Oltman, Oscar J.	Capt.
Philadelphia	Perloff, Harry	Capt.
Philadelphia	Petkov, Milton	Capt.
Philadelphia	Shapiro, Milton R.	Capt.
Philadelphia	Sherman, Arnold L.	Capt.
Philadelphia	Shick, William H.	Capt.
Philadelphia	Smailer, Charles P.	Capt.
Philadelphia	Turoff, Benjamin	Lieut.
Philadelphia	Turoff, Maurice L.	Capt.
Philadelphia	Victor, Julius	Capt.
Philadelphia	White, Milton	Lieut.
Pittsburgh	Dougert, John A.	Capt.
Pittsburgh	Gerstenzang, David H.	Capt.
Pittsburgh	Ignelzi, Michael A.	Maj.
Pittsburgh	Knotts, George W.	Capt.
Pittsburgh	Kreimer, Isadore M.	Capt.
Pittsburgh	Nauhaus, Herman H.	Capt.
Pittsburgh	Raden, Milton H.	Capt.
Pittsburgh	Sobel, George H.	Capt.
Pittsburgh	Weitz, John S.	Capt.
Pottsville	Cahan, Herbert N. D.	Capt.
Pottsville	Haskins, John F.	Capt.
Reading	Bair, John T., Jr.	Capt.
Reading	Meter, Charles M.	Capt.
Reading	Specker, John C.	Lt. Col.
Scranton	Balester, Frank J.	Capt.
Scranton	Klein, Albert L.	Capt.
Scranton	Lengler, Charles F.	Capt.
Scranton	Maslak, Harry N.	Capt.
Shamokin	Vastine, Frederick	Capt.
Smethport	Mook, Andrew W.	Capt.
Tamaqua	Stolbov, Morton S.	Capt.
Uniontown	Cohen, Abraham	Maj.
Uniontown	Townsend, W. J.	Lt. Col.
Upper Darby	Godmilow, Herbert	Capt.
Washington	McClay, Frederick J.	Capt.
Wellsboro	Mosch, John W.	Capt.
West Hazelton	Minor, William J.	Capt.
Wilkes-Barre	Mileski, Bernard J.	Capt
Wilkes-Barre	Pluto, Joseph C.	Capt.
Wilkes-Barre	Rielly, William E.	Capt.
Wilkinsburg	Town, Ronald A.	Capt.
Wynnewood	Graham, Gladwyn	Lt. Col.
York	Binford, Paul S.	Capt.
York	Weigel, Sterling J.	Capt.
	Puerto Rico	
Guayama	Carrasquillo, R. S.	Capt.
	Rhode Island	
Pawtucket	Squier, Edward R.	Maj.
Providence	Fleming, Theodore R.	Capt.
Providence	Hanzel, Harold	Capt.
	South Carolina	
Anderson	Templeton, Joseph T.	Capt.
Greenville	Anderson, Charles L.	Capt.
	South Dakota	
Sioux Falls	Ellenbecker, John R.	Capt.
Yankton	Lewis, Thomas E.	Capt.
	Tennessee	
Chattanooga	Hooper, F. W., Jr.	Capt.
Chattanooga	Landis, Charles F.	Maj.
Collierville	Glenn, James M., Jr.	Capt.
Copperhill	Boggess, J. Bige	Capt.
Elizabethtown	Miller, Albert E.	Capt.
Johnson City	Preas, Hugh L.	Maj.
Knoxville	Keith, Lewis Y.	Capt.
Memphis	Davis, Lorremer A.	Capt.
Memphis	Levitch, Louis	Capt.
Mountain Home	Smith, Marion R.	Capt.
Pulaski	Ballentine, Andrew M.	Capt.

Texas

Arlington	Snider, Richard A.	Capt.
Breckenridge	Moore, Edward L., Jr.	Capt.
Brownsville	Longoria, George	Capt.
Dallas	Hicks, C. J., Jr.	Maj.
Dallas	Hoot, Edwin S.	Capt.
Dallas	Mennis, Guy W.	Capt.
Dallas	Robertson, Joseph D.	Maj.
Fort Bend	Ward, William W.	Capt.
Fort Worth	Brown, Ernest B.	Capt.
Fort Worth	Lanham, Travis L.	Maj.
Houston	Alessandra, Matthew C.	Maj.
Houston	Butcher, Percy C., Jr.	Capt.
Houston	Collings, Dean G.	Lieut.
Houston	Dillard, Frank L.	Capt.
Houston	Jarratt, Henry M.	Capt.
Houston	Kendall, C. B., Jr.	Capt.
Houston	Levinson, Marcus	Capt.
Houston	Mannas, Joseph W.	Maj.
Houston	Poole, Fred M.	Capt.
Houston	Stewart, Joseph E.	Maj.
Houston	Taylor, Jack	Lieut.
Houston	Veale, Ernest	Capt.
Houston	Weinstein, Louis S.	Capt.
Kingsville	Califa, John J.	Capt.
Lubbock	Gesell, Alvin E.	Capt.
Miami	Corbin, Scott W.	Capt.
Paris	Kelley, William L.	Maj.
Perryton	Hobbs, Charles V.	Capt.
Plainview	McNeely, Theodore R.	Capt.
Port Arthur	Etchison, Floyd W.	Capt.
San Antonio	Morgan, Scruggs P.	Capt.
San Antonio	Selamn, Joe B.	Capt.
San Antonio	Wagenfuehr, M. E.	Capt.
Sherman	McGee, John B.	Maj.
Texas City	Fleming, Joseph W.	Maj.
Troup	Wilson, Hays L.	Capt.
Tyler	McNeill, Hardy B.	Capt.
Tyler	Pinkerton, Gus, Jr.	Capt.
Tyler	Snider, Gordon R.	Capt.
Wichita	Jones, Ernest B.	Capt.

Utah

Beaver	Harding, Lewis A.	Capt.
Murray	Wright, Sylvan L.	Capt.
Ogden	Burdett, William G.	Capt.
Ogden	Greenwell, Howard	Capt.
Salt Lake City	McBride, Bruce P.	Lieut.
Salt Lake City	Stevenson, Elbert	Capt.
Salt Lake City	Warburton, Morris J.	Capt.
South Tooele	Miller, Louis S.	Maj.
Wellsville	Allan, Glen L.	Capt.

Vermont

Rutland	Woods, Edward C.	Lieut.

Virginia

Alexandria	Hieronymus, W. J.	Capt.
Front Royal	Joyce, Milton A.	Lieut.
Lynchburg	Tinsley, William C.	Capt.
Portsmouth	Doughty, L. C., Jr.	Capt.
Richmond	Crowe, Edgar T.	Capt.
Richmond	Henderson, W. C.	Capt.
Richmond	Meistroff, Charles L.	Capt.
Richmond	Silberman, Samuel I.	Maj.
Staunton	Topping, Howard E.	Lt. Col.

Washington

Bremerton	Meili, Carl A.	Maj.
Bremerton	Starks, Milan V.	Capt.
Marysville	Moll, George B.	Capt.
Puyallup	Gross, John G.	Capt.
Seattle	Blaustein, Raymond E.	Capt.
Seattle	Jordan, John S.	Capt.
Seattle	Keenan, James M.	Capt.
Seattle	Shaffer, John W.	Capt.
Seattle	Simkins, Leslie C.	Col.
Seattle	Stoller, Arnold E.	Capt.
Seattle	Weissman, Mathew M.	Capt.
Spokane	Petrettee, Angelo F.	Capt.
Spokane	Swanson, Kenneth H.	Capt.
Spokane	Whitney, James H.	Capt.
Tacoma	Griffith, John W.	Maj.

West Virginia

Fairmont	Criss, James T.	Capt.
Harrisenburg	Switzer, John R., Jr.	Capt.
Morgantown	Price, Paul F.	Capt.
Wheeling	Van Horn, Francis F.	Lt. Col.

Wisconsin

Appleton	Killoron, Martin J.	Maj.
Beloit	Bigsby, Gordon J.	Capt.
Beloit	Nenahlo, Arnold J.	Capt.
Elkhart Lake	Horneck, Norbert M.	Capt.
Green Bay	Nockerts, Kenneth A.	Capt.
Green Bay	Schmidt, Carroll E.	Capt.
Horicon	Van Hollen, R. L.	Lt. Col.
Janesville	Smith, John W.	Capt.
Lone Rock	Dunbar, Edward N.	Capt.
Madison	Lange, Allert	Lt. Col.
Milwaukee	Dusick, Roy E.	Lieut.
Milwaukee	Kristal, Morris	Capt.
Milwaukee	Lefco, Seymour	Capt.
Milwaukee	Metzler, William F.	Maj.
Milwaukee	Rindfleisch, Marvin H.	Capt.
Milwaukee	Weinstein, Jack	Capt.
Oconto	Herald, Norbert A.	Capt.
Park Falls	Brich, Philip R.	Capt.
Racine	Merkel, Edmund A.	Capt.
Racine	Snyder, Charles W.	Capt.
Racine	Toft, Dallas G.	Capt.
Waukesha	Salter, Lyle J.	Capt.
Waukesha	Wilkins, Harry J.	Capt.
Wausau	Podruch, Louis L., Jr.	Capt.

Wyoming

Cheyenne	Kelly, Ambrose J.	Capt.
Sheridan	Guyer, Edmund E.	Capt.
Sheridan	Pfister, Charles S.	Capt.

Lieut. Laurence LaBar Lathrop, of Emporium, Pa., was erroneously reported as discharged from the Army Dental Corps.

LIST OF NAVY DENTAL OFFICERS SEPARATED FROM SERVICE

The following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

Alabama

Bay Minette	Reed, Jesse M.	Lieut.
Boaz	Cooley, William L.	Lieut.
Dothan	Hicks, Henry H.	Lieut.
Lincoln	Hall, Frank A.	Lieut.

Arizona

Phoenix	Foutz, Cyril D.	Lieut.
Phoenix	Geare, Joseph P.	Lieut.
Phoenix	King, Walter F.	Lieut.
Phoenix	Pugh, Spencer B.	Lieut.

Arkansas

Fort Smith	Blakemore, James F.	Lieut.
Paragould	Robbs, John A.	Lt. Cmdr.

California

Alameda	Roberts, Bernard F.	Lieut.
Alhambra	Prietto, Cesar A.	Lieut.
Burlingame	Peterson, Wilbert I.	Lieut.
Carlsbad	Hocking, Clare W.	Lt. Cmdr.
Compton	Taylor, John R.	Lieut.
Coronado	Bradshaw, Carl B.	Lieut.
Delano	Yoon, Charles	Lieut.
Dixon	Watson, Gordon L.	Lieut.
Downey	Chan, Paul C.	Lieut.
Fresno	Howard, C. P.	Lt. Cmdr.
Fresno	Morrish, Robert B.	Lieut.
Fresno	Sarkisian, Haig M.	Lieut.
Fresno	Schaaf, John W.	Lieut.
Hollywood	Zukerman, W. A.	Lt. Cmdr.
Huntington Park	Cole, Kenneth W.	Lieut.
Huntington Park	Wolff, Lippman W.	Lieut.
Long Beach	Hecht, Donald G.	Lieut.
Long Beach	Kaylor, Lawrence L.	Lieut.
Long Beach	Kronick, Elbert M.	Lieut.
Los Angeles	Bleak, Ralph W.	Lieut.
Los Angeles	Braun, Michael	Lieut.
Los Angeles	Christensen, Scott A.	Lieut.
Los Angeles	Clark, Walter M.	Lt. Cmdr.
Los Angeles	Coleman, Sam M.	Lieut.
Los Angeles	Ewing, Lee K.	Lieut.
Los Angeles	Hansen, R. T.	Lt. Cmdr.
Los Angeles	Koskoff, H. Stanley	Lieut.
Los Angeles	Morris, James R.	Lieut.
Los Angeles	Smith, Elbert R.	Lieut.
Los Angeles	Willey, Robert E.	Lieut.
Los Angeles	Wingfield, Leslie A.	Lieut.
N. Hollywood	Faul, John L.	Cmdr.
N. Hollywood	Smith, Everett H.	Lieut.
N. Long Beach	Helvoigt, K. A.	Lt. Cmdr.
Oakland	Peterson, John S.	Lieut.
Ontario	Ramsland, Russell J.	Lieut.
Orinda	Farrar, Lloyd L.	Lt. Cmdr.
Oxnard	Stoll, Arthur E.	Lieut.
Pacific Palisades	Crossland, Robert F.	Lieut.
Pacific Palisades	James, Donald H.	Lieut.
Pasadena	Mueller, Arlo N.	Lieut.
Point Loma	Newman, Roy L.	Lieut.
Ripon	DeJong, Harold	Lieut.
Riverside	Smith, John H.	Lieut.
Sacramento	Graves, Charles H.	Lieut.
Sacramento	Hill, Thomas K.	Lieut.
Salinas	Parker, Roderick J.	Lieut.
San Anselmo	Smith, Varon F.	Lt. Cmdr.
San Diego	Baumann, Thomas H.	Lieut.
San Diego	Falkenreck, Gerald C.	Lieut.
San Diego	Frame, James A.	Lieut.
San Diego	Grant, Robert, Jr.	Lieut.
San Diego	Lamb, Elmer E.	Lt. Cmdr.
San Diego	Lamb, Patrick J.	Lieut.
San Diego	Mullen, Joseph B.	Lieut.
San Diego	Oursland, Leon E.	Lieut.
San Diego	Pressman, Harold A.	Lieut.
San Diego	Watkins, Ervin L.	Lieut.
San Fernando	Kitch, Loran W., Jr.	Lieut.
San Francisco	Blodgett, Charles M.	Lieut.
San Francisco	Campbell, James G.	Lieut.
San Francisco	Crimmel, Ray H., Jr.	Lieut.
San Francisco	Dougall, W. W., Jr.	Lieut.
San Francisco	Goldstein, Charles M.	Lieut.
San Francisco	Gramacci, Albert J.	Lieut.
San Francisco	Greenlee, Harold E.	Lieut.
San Francisco	Jacobs, George L.	Lt. Cmdr.
San Francisco	Quigg, George T.	Cmdr.
San Francisco	Schneider, E. L.	Lieut.
San Francisco	Scott, J. Vinton	Lieut.
San Francisco	Seyms, Robert R.	Lieut.
San Francisco	Smith, Delman	Lieut.
San Francisco	Smith, Marcel J.	Lt. Cmdr.
San Francisco	Spangler, James R.	Lieut.
San Francisco	Spridgen, William A.	Capt.
San Francisco	Valencia, Ronald P.	Lieut.
San Francisco	Ward, Herbert E.	Lieut.
San Francisco	Wilson, H. E.	Lt. Cmdr.
San Francisco	Zulch, Frederick A.	Lieut.
San Francisco	Zynkian, Howard J.	Lieut.
San Jose	Anderson, Kimball M.	Lieut.
San Lorenzo	Beecher, Raymond E.	Lieut.
San Lorenzo	Bodily, David C.	Lieut.
San Luis Obispo	Pereira, Luiz A.	Lt. Cmdr.
San Pablo	Mallory, G. D., Jr.	Lieut.
San Pedro	Cooley, DeOrr	Lieut.
Santa Cruz	Bliss, Philip L.	Lieut.
Santa Monica	Thorpe, Glenn E.	Lieut.
Santa Monica	Trinkeller, Paul E.	Lieut.
Santa Rosa	Perry, Andrew J.	Lieut.
Selma	Dewhirst, Edwin M.	Lieut.
Tulare	Drilling, Thomas E.	Lieut.
Vallejo	Gibbons, T. M.	Lt. Cmdr.
Van Nuys	Wilson, W. B.	Lt. Cmdr.
Walnut Creek	Moore, E. A.	Lt. Cmdr.
West Los Angeles	Waara, Robert A.	Lieut.

Connecticut

Ansonia	Gardella, Edward C.	Lieut.
Greenwich	Juan, Henry W., Jr.	Lieut.
Greenwich	Romeo, Anthony F.	Lieut.
Hartford	Bloom, Jack	Lieut.
Hartford	Cohen, Sidney B.	Lieut.
Hartford	Goodman, Saul	Lieut.
Hartford	Kleiman, Albert	Lieut.
Hartford	Tulin, Bernard L.	Lt. Cmdr.
Milford	Brown, David C.	Lieut.
New Haven	Brown, J. H., Jr.	Lt. Cmdr.
New Haven	Gemski, Henry J.	Lieut.
New Haven	Zeender, Philip J. M.	Lieut.
Wethersfield	Jennings, Ernest M.	Lieut.
Wethersfield	Krikscium, E. F.	Lieut.
Willimantic	Horwitz, Sydney J.	Lieut.

District of Columbia

Washington	Andrews, John E., Jr.	Lieut.
Washington	Kraft, Fulton	Lt. Cmdr.
Washington	Mead, Sterling G.	Lieut.
Washington	Schlesinger, Arthur J.	Lieut.
Washington	Thompson, R. K., Jr.	Lieut.

Florida

Delray Beach	Davis, James K.	Lieut.
Melrose	Preston, Harold F., Jr.	Lieut.
Miami	Sansone, Joseph A.	Lieut.
Miami	Turner, Leonard S.	Lieut.
Miami	Whetstone, Wendell	Lieut.
Miami Beach	Michnoff, D. M.	Lieut.
Warrington	Herzon, Emanuel M.	Lieut.

Georgia

Atlanta	Morrison, T., Jr.	Lieut.
Atlanta	Nichols, Paul H., Jr.	Lieut.
Atlanta	Sobelson, Bertram	Lt. Cmdr.
Cartersville	Lowry, Harold J.	Lieut.
Colquitt	Fudge, Felix P.	Lieut.
Columbus	Snellings, Schley D.	Lieut.
Concord	Smith, James L.	Lieut.
Cordele	Dekle, George E.	Lieut.
Fitzgerald	Dickens, James L.	Lieut.
Fort Valley	Turrentine, Minor O.	Lieut.
Rome	Alexander, Hugh A.	Lieut.
Savannah	Hamrick, John B.	Lieut.

Idaho

Coeur d'Alene	Matson, Leo W.	Lieut.
Idaho Falls	Packard, Herbert R.	Lieut.
Nampa	Faylor, Milford M.	Lieut.
Preston	Chatterton, Don B.	Lieut.
Preston	Larson, Reed P.	Lieut.

Illinois

Berwyn	Melichar, William J.	Lieut.
Cairo	Walder, Charles G.	Lieut.
Chicago	Ahner, Charles L.	Lt. Cmdr.
Chicago	Allegretti, Leonard N.	Lieut.
Chicago	Arra, Romeo R.	Lieut.
Chicago	Baker, John F.	Lieut.
Chicago	Basko, Gerald T.	Lieut.
Chicago	Boelens, Peter A.	Lieut.
Chicago	Boman, Vernon R.	Lieut.
Chicago	Crabbe, Edwin P.	Lieut.
Chicago	D'Andrea, Charles J.	Lieut.
Chicago	Dunn, David S.	Lieut.
Chicago	Dusik, Thaddeus F.	Lieut.
Chicago	Fishman, Irving	Lieut.
Chicago	Flavin, Byron F.	Lt. Cmdr.
Chicago	Friedman, William W.	Lieut.
Chicago	Gaebe, Herman O.	Cmdr.
Chicago	Gillottee, Aldo E.	Lieut.
Chicago	Golden, Lawrence	Lieut.
Chicago	Graves, E. B., Jr.	Lieut.
Chicago	Halper, Louis	Lt. Cmdr.
Chicago	Heinz, John A.	Lieut.
Chicago	Johnston, Wesley G.	Lieut.
Chicago	Kelleher, Andrew J.	Lieut.
Chicago	Knitter, Orville W.	Lieut.
Chicago	Krause, Arthur M.	Lieut.
Chicago	Larson, Jack L.	Lieut.
Chicago	Lewis, Raymond R.	Lieut.
Chicago	McAuliffe, Thomas J.	Lieut.
Chicago	McSweeney, Dennis J.	Lieut.
Chicago	Missak, Walter G.	Lieut.
Chicago	Mitranitza, Andrew E.	Lieut.
Chicago	Nowak, Edmund T.	Lieut.
Chicago	Olivi, Emil J.	Lieut.
Chicago	Pabich, Edwin R.	Lieut.
Chicago	Perlow, Harry N.	Lt. Cmdr.
Chicago	Pierzynski, R. T.	Lieut.
Chicago	Puszkiewicz, E. S.	Lieut.
Chicago	Radochonski, S. P.	Lieut.
Chicago	Remensnyder, R. W.	Lieut.
Chicago	Ritza, Michael A.	Lieut.
Chicago	Simkus, John J.	Lieut.
Chicago	Sir, Walter H.	Lieut.
Chicago	Stillerman, Joseph J.	Lieut.
Chicago	Stroup, Clyde L.	Lieut.
Chicago	Tener, William C.	Lt. Cmdr.
Chicago	Toraason, Donald G.	Lieut.
Chicago	Vlemink, George E.	Lieut.
Chicago	Wagner, Carl F.	Lt. Cmdr.
Chicago	Wirth, Norman J.	Lieut.
Collinsville	Pfaff, Casper P.	Lieut.
Donovan	Peterson, George R.	Lieut.
Eldorado	Vessell, James H.	Lieut.
Elgin	Foster, Victor C.	Lt. Cmdr.
Evanston	Ambrose, J. C.	Lt. Cmdr.
Evanston	Fleming, Robert D.	Lieut.
Evanston	Rhobotham, Frank B.	Lieut.
Evergreen Park	Wiegel, Raymond E.	Lieut.
Flossmoor	Moldal, Oren H.	Lieut.
Freeport	Cannova, Anthony J.	Lieut.
Galesburg	Cabeen, Robert P.	Lieut.
Highland Park	Churchill, Jack K.	Lieut.
Highland Park	Wells, Paul H.	Cmdr.
Joliet	Van Steenberg, G. C.	Lieut.
Kankakee	Spangler, Robert E.	Lieut.
Kenilworth	McEwen, Willard W.	Lieut.
Lincoln	Goebel, Dean E.	Lieut.
Maywood	McNeil, Warren W.	Lieut.
Maywood	Unterman, Martin D.	Lieut.
Mendota	Shapiro, Abraham J.	Lieut.
Moline	Peterson, Eugene G.	Lieut.
Norris City	Starr, George H., Jr.	Lieut.
Oak Park	Cook, Maynard B.	Lieut.
Oak Park	King, Robert A.	Lieut.
Oak Park	Martin, A. S., Jr.	Lieut.
Oak Park	Murray, R. W.	Lt. Cmdr.
Peru	Ream, Walter J.	Lieut.
Quincy	Lamb, Carl E.	Lt. Cmdr.
Quincy	Wolfe, Leroy M.	Lieut.

Skokie	Stegmaier, E. B.	Lt. Cmdr.
Springfield	Cannon, John F.	Lt. Cmdr.
Springfield	King, Andy R.	Lieut.
Walnut	Kranov, Donald S.	Lieut.
Wheaton	Farmer, Gilbert J.	Lieut.

Indiana

Anderson	Parker, Chauncey C.	Lieut.
Bloomington	Hull, James R.	Lieut.
East Chicago	Niblick, Charles W.	Lieut.
Gary	Metaxas, Gus G.	Lieut.
Hammond	Hutton, Joseph L.	Lieut.
Indianapolis	James, George W.	Lieut.
Indianapolis	Wurtz, Robert W.	Lt. Cmdr.
Oakland City	Dunigan, Gerald E.	Lieut.
Oakland City	Hunley, Theodore R.	Lieut.
Rensselaer	Pavy, Robert L.	Lieut.
Rochester	McGuire, Walter C.	Lieut.
Sullivan	Lybke, Avon B.	Lt. Cmdr.
West Lafayette	Felknor, Joe B.	Lieut.

Iowa

Ackley	Kurth, Paul A.	Lieut.
Ames	Kruger, Robert W.	Lieut.
Ames	Moore, Robert L.	Lieut.
Cantril	Downing, James O.	Lieut.
Cedar Rapids	Heck, Kenneth E.	Lieut.
Decorah	Pack, Chester K.	Lieut.
Dubuque	Link, John A.	Lieut.
Elk Horn	James, Paul E.	Lieut.
Gladbrook	McDowall, Gilbert T.	Lieut.
Grundy Center	Redding, Arthur W.	Lieut.
Independence	Tidball, Wellar D.	Lieut.
Iowa City	Enke, Loren F.	Lieut.
Muscatine	Lease, William G.	Lieut.
Muscatine	McPike, J. D.	Lt. Cmdr.
Newton	Masters, Maurice E.	Lieut.
Orange City	Sterrenberg, C. C., Jr.	Lieut.
Rockwell City	Fonda, Robert W.	Lieut.
Sloan	Buser, Donald J.	Lieut.
Washington	Dwyer, W. D.	Lt. Cmdr.
Waterloo	Dunn, Justin G.	Lieut.
Waterloo	Hutchinson, R. H.	Lieut.

Kansas

Clay Center	Brose, Donald S.	Lieut.
Green	Morton, Joseph H.	Lieut.
Hamlin	Hoban, John D.	Lt. Cmdr.
Hillsboro	Voth, Harold K.	Lieut.
Hutchinson	Allen, Fletcher G.	Lt. Cmdr.
Hutchinson	Perrin, Wayne J., Jr.	Lieut.
Iola	Stephenson, H. M.	Lt. Cmdr.
Le Roy	Kesner, Milo M.	Lt. Cmdr.
Newton	Hertzler, William R.	Lieut.
Parsons	Wart, James E.	Lieut.
Wichita	Rose, Aaron W.	Lieut.

Kentucky

Barbourville	Benjamin, Mason N.	Lieut.
Bardstown	Wheat, Jesse J.	Lieut.
Hopkinsville	Lockwood, Allen T.	Cmdr.
Louisville	Hamburg, David S.	Lieut.
Louisville	Mowery, William E.	Lieut.
Louisville	Petty, Hubert E.	Lieut.
Louisville	Safriet, Irvin Y.	Lieut.
Louisville	Vogt, Frank S., Jr.	Lt. Cmdr.
Louisville	Welsh, Elvin A.	Lieut.

Louisiana

Baton Rouge	Barrow, Wylie C.	Lieut.
Baton Rouge	Brousseau, J. C.	Lt. Cmdr.
Baton Rouge	Jackson, William P.	Lieut.
Bunkie	Rutledge, C. E., Jr.	Lieut.
Donaldsonville	Vega, Sidney V.	Lt. Cmdr.
Minden	Williams, Sam, Jr.	Lieut.
New Orleans	Barletta, William E.	Lieut.
New Orleans	Dominguez, James F.	Lieut.
New Orleans	Faget, Edward H.	Lieut.
New Orleans	Merchant, A. E., Jr.	Lt. Cmdr.
New Orleans	Sugg, William C.	Lieut.
Ruston	Mace, Roy J.	Lieut.

Maine

Augusta	Edwards, Norman L.	Lieut.
Bath	Hibbs, George W.	Lt. Cmdr.
Lewiston	Fahey, William E.	Lieut.
Waterville	Bourassa, R. J.	Lt. Cmdr.

Maryland

Baltimore	Fales, Donald G.	Lieut.
Baltimore	Inman, Conrad L., Jr.	Lieut.
Baltimore	Lankford, Allan M.	Lieut.
Baltimore	McWilliams, John E.	Lieut.
Chevy Chase	Footer, Jerome	Lieut.
Chevy Chase	Smallwood, W. L.	Lt. Cmdr.
Libertytown	Hammond, F. S., Jr.	Lieut.
Salisbury	Wilson, Edward P.	Lieut.
Taneytown	Mehring, Richard S.	Lieut.

Massachusetts

Belmont	Russell, Edmund G.	Lieut.
Beverly	Hersey, Glenwood I.	Lieut.
Boston	Callahan, Charles J.	Lieut.
Boston	Cohen, Arthur I.	Lieut.
Boston	Story, John E.	Lieut.
Brighton	Frye, Edward	Lt. Cmdr.
Brighton	Josephson, Elliot H.	Lieut.
Brookline	Conway, J. A.	Lt. Cmdr.
Chestnut Hill	Sonis, Herbert R.	Lieut.
Dorchester	Begin, Arthur A.	Lt. Cmdr.
Duxbury	Ludlow, Clarence E.	Lieut.
Falmouth	Bohaker, Lloyd A.	Cmdr.
Framingham	Castellani, Alexander	Lieut.
Gloucester	Russell, Seymour W.	Lieut.
Greenfield	MacDonald, D. R.	Lieut.
Kingston	Gorham, Thomas D.	Lieut.
Lawrence	Anderson, Richard I.	Lieut.
Lawrence	Seccareccio, Paul J.	Lieut.
Lexington	Glashow, Arnold I.	Lieut.
Lowell	Mroz, Edwin T.	Lieut.
Malden	Killilea, John F.	Lieut.
Millbury	Yesukevich, John F.	Lieut.
Milton	Barry, Robert S.	Lieut.
Milton	Thompson, C. W., Jr.	Lieut.
Needham	Dyer, Harold E.	Lt. Cmdr.
New Bedford	Pejko, Walter M.	Lieut.
New Bedford	Tessier, Ralph J.	Lieut.
North Adams	Spofford, Karl E.	Lieut.
Pittsfield	Johnson, Robert F.	Lieut.
Roxbury	Bellotti, Joseph A.	Lt. Cmdr.
Saugus	Roos, Donald A.	Lieut.
Shelburne Falls	Riley, William R.	Lieut.
Stoughton	Kenny, Francis E.	Lieut.
Wellesley	Ferioli, Rufus J.	Lieut.
West Newton	Hayden, Thomas S.	Lieut.

West Roxbury	Goodman, John E.	Lieut.
Winthrop	Milne, Leslie	Lt. Cmdr.

Michigan

Albion	Abbott, Duane C.	Lieut.
Allegan	Miller, Steward W.	Lieut.
Ann Arbor	Brown, Vincent D.	Lieut.
Ann Arbor	DeMartin, Rolando R.	Lieut.
Ann Arbor	Harvey, Emerson J.	Lieut.
Ann Arbor	Ward, Donald M.	Lieut.
Battle Creek	Kellogg, Richard	Cmdr.
Brighton	Pelkey, Gerald J.	Lieut.
Coldwater	Long, John A.	Lieut.
Dearborn	Brown, Donald R.	Lieut.
Dearborn	Gregory, R. S.	Lt. Cmdr.
Detroit	Backus, Thomas H.	Lieut.
Detroit	Dix, Harmon	Lieut.
Detroit	Dusty, John E.	Lieut.
Detroit	Forman, Julius J.	Lieut.
Detroit	Hosbein, John V.	Lt. Cmdr.
Detroit	Kline, Allan H.	Lt. Cmdr.
Detroit	Kocsis, Arnold J.	Lieut.
Detroit	Lerminey, Frank A.	Lieut.
Detroit	Markey, Joseph S.	Lieut.
Detroit	Skalski, Zane Z.	Lieut.
Detroit	Wisner, Edwin J.	Lieut.
East Lansing	Stanton, W. O.	Lt. Cmdr.
Flint	Hart, Max S.	Lieut.
Fremont	Noble, L. W.	Lt. Cmdr.
Gladstone	Skellenger, Byron H.	Lieut.
Grand Haven	Kammeraad, H. J.	Lieut.
Grand Rapids	Ritzema, Donald J.	Lieut.
Grosse Pt. Farms	Barkley, Joseph A.	Lieut.
Grosse Pt. Woods	Burridge, S. P.	Lt. Cmdr.
Hamilton	Lubbers, Julius A.	Lieut.
Harbor Springs	Graham, Thomas F.	Lieut.
Highland Park	Brady, Edward M.	Lieut.
Holland	Vegter, John R.	Lieut.
Iron Mountain	Fornetti, Theodore B.	Lieut.
Iron River	Tyler, John R.	Lieut.
Lansing	Nedelman, Irving	Lieut.
Pleasant Ridge	Pool, Edson K.	Lt. Cmdr.
Pontiac	Haidle, A. W.	Lt. Cmdr.
Port Huron	Stevens, Charles W.	Lieut.
River Rouge	Maleske, Arthur J.	Lieut.
Royal Oak	Watch, Earl J.	Lieut.
Saginaw	Graham, L. A.	Lt. Cmdr.
Stephenson	Veranth, Charles O.	Lieut.

Minnesota

Austin	Cullen, Vern R.	Cmdr.
Clearbrook	Nelson, Leslie B.	Lt. Cmdr.
Duluth	Kuth, Robert A.	Lieut.
Ely	Brownell, Wayne H.	Lieut.
Grand Rapids	Gessner, Roy C.	Lieut.
Hopkins	Swenson, Robert E.	Lieut.
Mankato	Kinney, B. R.	Lt. Cmdr.
Minneapolis	Becker, Lester A.	Lieut.
Minneapolis	Carlson, Robert W.	Lieut.
Minneapolis	Peterson, R. G.	Lt. Cmdr.
Minneapolis	Swanstrom, Robert L.	Lieut.
Minneapolis	Wiethoff, R. W.	Lt. Cmdr.
Morris	Thelen, Lee N.	Lieut.
St. Cloud	Cook, F. J.	Lt. Cmdr.
St. Paul	Birnberg, Leon D.	Lieut.
St. Paul	Cumming, Arthur D.	Lieut.
St. Paul	Geist, George A., Jr.	Lieut.
St. Paul	Madsen, A. M., Jr.	Lieut.
St. Paul	Schneider, Carl F.	Lieut.
Sleepy Eye	Renneke, Donald H.	Lieut.
Soudan	Dragavon, F. S.	Lt. Cmdr.
Willmar	Westerdahl, F. R.	Lt. Cmdr.

Mississippi

Aberdeen	Martin, Albert F.	Lieut.
Baldwyn	Shirley, William B.	Lieut.
Calhoun City	Dobbs, Solon C.	Lieut.
Corinth	Norwood, Carl W., Jr.	Lieut.
Jackson	May, Robert A.	Lieut.
Meridian	Lawson, W. W.	Lt. Cmdr.

Missouri

Cape Girardeau	Grisham, Vern P.	Lt. Cmdr.
Clayton	Hoffman, Harry R.	Lieut.
Clayton	Reilly, John V.	Lt. Cmdr.
Glendale	Harris, Robert A.	Lieut.
Greenfield	Thweatt, R. R.	Lt. Cmdr.
Kansas City	Aikin, George E., Jr.	Lieut.
Kansas City	Flynn, James A.	Lt. Cmdr.
Kansas City	Hill, John W. B.	Lieut.
Kansas City	Humphreys, K. W.	Lieut.
Kansas City	Luna, George R.	Lieut.
Kansas City	Patrick, W. L.	Lieut.
Kansas City	Whitehead, Wayne C.	Lieut.
Kirkwood	Engel, Arthur L.	Lt. Cmdr.
Normandy	Schaedlich, Oliver W.	Lieut.
Odessa	Osborn, S. E., Jr.	Lieut.
Richmond Hts.	Jones, William M.	Lieut.
St. Clair	Iman, James E.	Lieut.
St. Louis	Crenshaw, W. C., Jr.	Lieut.
St. Louis	Garrigan, Stephen J.	Lieut.
St. Louis	Jasper, Milton H.	Lieut.
St. Louis	Lundergan, Leo B.	Lieut.
St. Louis	Orlick, Frank H.	Lieut.
St. Louis	Oullet, David B.	Lieut.
St. Louis	Stanton, John C.	Lieut.
Sedalia	Klein, Benjamin E.	Lieut.
University City	Stoller, Sidney E.	Lieut.
West Plains	Thornburgh, Max H.	Lieut.

Montana

Missoula	Reineke, Francis G.	Lieut.
Philipsburg	Smith, James E.	Lieut.

Nebraska

Bloomfield	Settell, Robert L.	Lieut.
Curtis	Nelson, Richard J.	Lieut.
Eddyville	Thurman, Glen W.	Lieut.
Fremont	Williams, Frank G.	Lieut.
Hastings	Walter, James M.	Lieut.
Lincoln	Fastabend, Henry L.	Lieut.
Norfolk	Curtis, Loren W.	Lieut.

Nevada

Reno	Johannes, Arnold	Lieut.
Reno	McNeil, Harold R.	Lieut.

New Hampshire

Berlin	Halvorson, W. H.	Lieut.
Concord	Degnan, John B.	Lt. Cmdr.
Manchester	Elliott, Robert H.	Lieut.
Nashua	Lometti, Guido M.	Lieut.

New Jersey

Arlington	Wilkinson, Milton S.	Lieut.
Basking Ridge	Russell, Donald G.	Lieut.

Bayonne	Kobren, Abraham	Lieut.
Clifton	Kuller, Edward J.	Lieut.
Dover	Johnston, S. B., III	Lieut.
Englewood	Link, Nathan H.	Lieut.
Haddon Heights	David, Theodore A.	Lieut.
Hammonton	Rubba, Anthony	Lt. Cmdr.
Maplewood	Savini, Daniel A.	Lieut.
Morristown	Delpho, Donald A.	Lieut.
Newark	Bryce, Charles F.	Lieut.
Newark	Garrison, J. H.	Lt. Cmdr.
Newark	Reinhard, Walter W.	Lieut.
Newark	Reitman, Nelson R.	Lieut.
North Plainfield	Jaffe, Murray D.	Lieut.
Orange	Olsen, L. J., Jr.	Lieut.
Passaic	Dobrowolski, William	Lieut.
Passaic	Furman, Francis J.	Lieut.
Passaic	Kramer, Nathan	Lt. Cmdr.
Plainfield	Danys, Albert A.	Lieut.
Plainfield	Sage, Willis F.	Lieut.
Summit	Micone, Edward J.	Lieut.
Trenton	Dobronte, Frank	Lieut.
Trenton	Zak, Edward W.	Lieut.
Upper Montclair	Applegate, W. V.	Lieut.
Westfield	Bray, George A.	Lieut.
Westfield	Gilbert, Harold H.	Lieut.
Westfield	Mudge, Joseph W.	Lieut.

New Mexico

Carlsbad	Burch, William P., Jr.	Lieut.
Roswell	Hurning, James H.	Lieut.

New York

Albany	Brand, Jewell C., Jr.	Lieut.
Amsterdam	Morini, Alfred J.	Lieut.
Binghamton	Konick, Abe	Lt. Cmdr.
Bronx	Bonifer, Harold W.	Lieut.
Bronx	Boscarelli, Ignazio F.	Lieut.
Bronx	Cooper, Israel	Lieut.
Bronx	Vierno, Joseph D.	Lieut.
Brooklyn	Ascher, Daniel	Lieut.
Brooklyn	Chessin, G. M.	Lt. Cmdr.
Brooklyn	Colombo, Angelo D.	Lieut.
Brooklyn	DeStefano, Vincent G.	Lieut.
Brooklyn	Fatt, Irwin	Lt. Cmdr.
Brooklyn	Gitelman, Victor	Lieut.
Brooklyn	Gordon, Jacob	Lieut.
Brooklyn	Grossman, Daniel S.	Lieut.
Brooklyn	Lauer, Irwin J.	Lieut.
Brooklyn	Lippsett, Murray	Lieut.
Brooklyn	McKay, Robert C.	Capt.
Brooklyn	Mann, Norman E.	Lieut.
Brooklyn	May, Edward J.	Lieut.
Brooklyn	Mulhearn, T. J.	Lt. Cmdr.
Brooklyn	Newman, Harold	Lieut.
Brooklyn	Quat, Edward	Lieut.
Brooklyn	Sabbia, Frank J.	Lieut.
Brooklyn	Siegel, Eli H.	Lt. Cmdr.
Brooklyn	Tennen, Harold J.	Lieut.
Brooklyn	Tolkoff, Edward	Lieut.
Brooklyn	Wells, Francis M.	Lieut.
Brooklyn	Wiener, Murray L.	Lieut.
Buffalo	Rooney, James M.	Lieut.
Cohoes	Tessier, F. J.	Lt. Cmdr.
East Bronx	Gruber, Bernard E.	Lieut.
Freeport	Glenn, Albert B.	Lieut.
Glen Cove	Canarick, Sidney	Lt. Cmdr.
Hudson	Arnold, William C.	Lieut.
Jackson Heights	Adamson, R. N.	Lt. Cmdr.
Jamestown	White, Gordon E.	Lieut.
Long Island	Guccione, Quentin A.	Lieut.
Long Island	Hribar, George M.	Lieut.
Long Island	Nebel, Murray	Lieut.
Long Island	Ostreicher, Herbert P.	Lieut.
Long Island	Ross, Edward G.	Lt. Cmdr.
Long Island	Van Daum, V. W.	Lieut.
Long Island	Weiss, John W.	Lieut.
Lynbrook	Pierce, Wilbur F., Jr.	Lieut.
Lynbrook	Thoma, Robert F.	Lieut.
Mount Vernon	Gilberg, Samuel L.	Lieut.
New York	Clark, Philip J.	Lieut.
New York	Fine, Herbert S.	Lieut.
New York	Greenwald, Lester E.	Lieut.
New York	Heller, Stanley H.	Lieut.
New York	Herman, Roland	Lieut.
New York	Kaplan, Seymour J.	Lieut.
New York	Kerr, Norman M.	Lt. Cmdr.
New York	Kirschner, Nathan	Lieut.
New York	Levine, Howard B.	Lieut.
New York	Love, Joseph W.	Lieut.
New York	Rawitt, Eugene	Lieut.
New York	Stella, Armand M.	Lieut.
New York	Taggard, Joseph F.	Lieut.
New York	Urban, Harold G.	Lieut.
New York	Vogel, Stanley W.	Lieut.
Ogdensburg	Putney, W. R.	Lt. Cmdr.
Port Chester	Slater, Ralph A.	Lieut.
Rego Park	Gallo, Daniel, Jr.	Lieut.
Rochester	Kristal, Bernard S.	Lieut.
Rochester	Merriman, Robert F.	Lieut.
Rochester	Sloan, Martin	Lieut.
Rome	Arthur, James D.	Lieut.
Rome	Hanchar, Morris J.	Lieut.
Schenectady	Cornell, Peter J.	Lieut.
Schenectady	Ehrcke, John W.	Lieut.
Schenectady	McMullen, Earl, Jr.	Lieut.
Schenectady	Senn, John W.	Lieut.
Shortsville	Stage, Everett M.	Lieut.
Spring Valley	Zodda, Frank J.	Lt. Cmdr.
Staten Island	Hewett, Howard F.	Lieut.
Syracuse	DeFurio, Louis T.	Lieut.
Watertown	Capone, Anthony C.	Lieut.
Webster	Averill, Hugh M.	Lieut.
White Plains	Rochester, A. M.	Lt. Cmdr.
Woodmere	Rosenberg, Albert E.	Lieut.
Yonkers	Bibbo, James V., Jr.	Lieut.

North Carolina

Dallas	Boyles, Jack L.	Lieut.
Durham	Penny, Glenn R.	Lieut.
New Bern	Lansche, Francis E.	Lieut.
Raleigh	Jones, England B., Jr.	Lieut.
Washington	Bell, Franklin D.	Lieut.
Wilmington	Bellois, William B.	Lieut.

North Dakota

McClusky	Riha, Stanley W.	Lieut.

Ohio

Akron	Mungo, Victor A.	Lieut.
Akron	Rohrich, Paul G.	Lieut.
Ashland	Tucker, Dorell V.	Lieut.
Canton	Kern, Peter E.	Lieut.
Cleveland	Holliday, Joseph E.	Lieut.
Cleveland	Kniesner, Albert H.	Lieut.
Cleveland	McKinley, T. E.	Lieut.
Cleveland	Zembra, George W.	Lieut.

Cleveland Hts.	Delaney, Bernard A.	Lieut.
Cleveland Hts.	Holland, John E.	Lieut.
Cleveland Hts.	Richards, Frank V.	Lieut.
Cleveland Hts.	Okum, Maurice D.	Lieut.
Cleveland Hts.	Zabell, Manny S.	Lieut.
Columbus	Bush, Alden J., Jr.	Lieut.
Columbus	George, Roy E.	Lieut.
Columbus	Townsend, George R.	Lieut.
Coshocton	Carpenter, Wayne H.	Lieut.
Creola	Lee, Arnold R.	Lieut.
Dayton	Rice, Mark H.	Lieut.
Dayton	Wehner, Paul J.	Lieut.
East Cleveland	Bottomy, Clarence P.	Lieut.
East Cleveland	Millsop, Robert C.	Lieut.
Erieside	Hagesfeld, C. W.	Lieut.
Genoa	Toye, Frederick C.	Lieut.
Ironton	Watters, Joseph L.	Lieut.
Lakewood	Fallon, Gerald A.	Lt. Cmdr.
Loudonville	Humphrey, Stanley P.	Lieut.
Louisville	Tate, James C.	Lieut.
Mansfield	Sneeringer, Alfred L.	Lieut.
Massillon	Gardner, Robert V.	Lieut.
Morrow	Kemper, Paul T.	Lieut.
Newton	Crull, Clifford L.	Lieut.
Paulding	Burke, Robert S.	Lieut.
Portsmouth	White, Walter L.	Lieut.
Tiffin	Boner, Gerald L.	Lieut.
Tiffin	Carrigan, William A.	Lieut.
Toledo	Adamwicz, James R.	Lieut.
Toledo	Dwight, Charles D.	Lieut.
Toledo	Jackson, Richard W.	Lieut.
Warren	Immel, Robert M.	Lieut.
Zanesville	Hill, William B.	Lieut.

Oklahoma

Altus	Mabry, Earl H.	Lieut.
Boise City	Etling, Larus D.	Lieut.
Elgin	Martin, Warren O.	Lieut.
McAlester	Hammond, John R.	Lieut.
Norman	Mayfield, James W.	Lieut.
Oklahoma City	Ishmael, Don M.	Lieut.
Shawnee	Pinkner, Joe, Jr.	Lt. Cmdr.
Tulsa	Ingram, Elgin C.	Lieut.

Oregon

Albany	Arthur, Robert L.	Lieut.
Astoria	Friedrich, Robert V.	Lieut.
Baker	Rossina, W. R.	Lt. Cmdr.
La Grande	Ingram, Clarence L.	Lieut.
La Grande	Paladina, G. A.	Lt. Cmdr.
Portland	Baldwin, T. R., Jr.	Lieut.
Portland	Done, Huck R.	Lieut.
Portland	Ellison, Clarence K.	Lieut.
Portland	Guild, Arthur K.	Lieut.
Portland	Meany, John J.	Lieut.
Portland	Wood, John R.	Lieut.

Pennsylvania

Ashland	Mulroy, E. J.	Lt. Cmdr.
Bangor	Strout, C. C., Jr.	Lieut.
Beaver	McDonald, Charles C.	Lieut.
Bellevue	Berger, William G.	Lieut.
Bentleyville	George, William D.	Lieut.
Bryn Mawr	Glauner, G. P.	Lt. Cmdr.
Carnegie	Wilson, H. R., Jr.	Lieut.
Central City	Wiseman, J. E.	Lt. Cmdr.
Clearfield Co.	Thon, Virgil E.	Lieut.
Coraopolis	Watson, Robert L.	Lieut.
Elizabeth	Monheim, A. I.	Lt. Cmdr.
Emmaus	Rahn, Leroy T.	Lt. Cmdr.
Erie	McDougall, W. J.	Lieut.
Fairchance	Patterson, W. W.	Lieut.
Fayetteville	Shively, Max G.	Lieut.
Harrisburg	Holtzman, T. W.	Lieut.
Imperial	Marshall, Clare C.	Cmdr.
Kingston	Koehler, Warren E.	Lieut.
Larksville	Siegal, John W.	Lieut.
Lilly	Best, John V., Jr.	Lieut.
New Salem	DeHaas, E. P., II	Lieut.
Philadelphia	DeBaecke, Henry L.	Lieut.
Philadelphia	Eshelman, Jay H.	Lieut.
Philadelphia	Francis, R. A., Jr.	Lieut.
Philadelphia	Goldstein, G. D.	Lt. Cmdr.
Philadelphia	Halpern, H. S.	Lt. Cmdr.
Philadelphia	Myers, F. J., Jr.	Lieut.
Philadelphia	Scally, Joseph L.	Lieut.
Philadelphia	Sesso, Charles C.	Lieut.
Philadelphia	Steele, Merton W.	Lieut.
Pittsburgh	Ganley, C. J.	Lt. Cmdr.
Pittsburgh	Harris, James W.	Lieut.
Pittsburgh	Hoffman, Charles H.	Lieut.
Pittsburgh	Klaus, John M.	Lt. Cmdr.
Pittsburgh	Mathieson, John B.	Lieut.
Pittsburgh	O'Loughlin, John L.	Lieut.
Pottstown	Hallman, James A.	Lieut.
Selinsgrove	Clark, James H.	Lt. Cmdr.
Sewickley	Peiffer, Glenn W., Jr.	Lieut.
Shippensburg	Brown, Charles M.	Lieut.
Sunbury	Bucher, John F.	Lieut.
Warren	Richards, James E.	Lieut.
West Lawn	Haas, Benjamin J.	Lieut.
Wilkes-Barre	Stanton, James P.	Lieut.
Wrightsville	Casner, Herbert D.	Lieut.
York	Reidel, Orvin R.	Lieut.

Rhode Island

N. Providence	Ricci, Eugene	Lieut.
Pawtucket	Casey, William R.	Lt. Cmdr.
Providence	Carmody, John J.	Lt. Cmdr.
Providence	Osmanski, William T.	Lieut.
Providence	Ricciardi, A. U.	Lieut.
Valley Falls	McGrath, Philip S.	Lieut.

South Carolina

Charleston	Karesh, Stanley H.	Lieut.
Columbia	Bradley, F. W., II	Lt. Cmdr.

South Dakota

Hot Springs	Croup, John F.	Lieut.
Lead	Toscana, Francis J.	Lieut.
Tripp	Schwantes, James H.	Lieut.

Tennessee

Dayton	Morgan, Harold A.	Lieut.
Franklin	Meacham, M. P.	Lieut.
Henderson	Brigance, F. W.	Lieut.
Knoxville	Beeler, Ted P.	Lieut.
Memphis	Hendrix, M. B., Jr.	Lieut.
Memphis	Willien, W. F., Jr.	Lieut.
Paris	Patterson, Billie M.	Lieut.

Texas

Abilene	Roberson, William A.	Lieut.
Amarillo	Jones, Thomas B., Jr.	Lieut.
Amarillo	Wyatt, John C., Jr.	Lieut.

Austin	Worrell, William H.	Lieut.
Boston	Looney, David L.	Lieut.
Cleburne	Altaras, Francis E.	Lieut.
Cross Plains	Strahan, Bruce B.	Lieut.
Dallas	Gaines, Jimmie F.	Lieut.
Dallas	Green, David S.	Lieut.
Dallas	McMinn, J. M., Jr.	Lieut.
Dallas	Reynolds, James M.	Lieut.
Dallas	Smith, Joe H.	Lieut.
Dallas	Thornton, Ralph J.	Lieut.
Denton	Wilson, John J.	Lieut.
El Campo	Bloomquist, John F.	Lieut.
Elgin	Cherry, L. P., Jr.	Lieut.
Fort Worth	Helbing, Leslie J.	Lt. Cmdr.
Fort Worth	Murff, C. Y., Jr.	Lt. Cmdr.
Fredericksburg	Keidel, Robert P.	Lieut.
Hawkins	Morrison, James E.	Lieut.
Honey Grove	Evans, Burnett B.	Lieut.
Houston	Bauer, Howard G.	Lieut.
Houston	Carpenter, John A.	Lieut.
Houston	Compere, T. H., Jr.	Lieut.
Houston	Downen, Richard A.	Lieut.
Houston	Feagin, James H.	Lieut.
Houston	Macanliss, M. A.	Lieut.
Houston	Stovall, William L.	Cmdr.
Houston	Summers, F. G.	Lt. Cmdr.
Jacksonville	Steffens, W. H., Jr.	Lieut.
Lamesa	Alexander, J. W.	Lieut.
Lovelady	Young, Ira J.	Lieut.
Luling	Rabon, Sam H., Jr.	Lieut.
Odessa	Clark, Jim T.	Lieut.
Palestine	Shroyer, John V.	Lieut.
Pampa	Campbell, W. L.	Lt. Cmdr.
Port Arthur	Box, Murff W.	Lieut.
Riesel	Bernhausen, E. R.	Lieut.
Rising Star	Ramsey, Elenzo H.	Lieut.
San Antonio	Bush, John L.	Lt. Cmdr.
Seagraves	Caveness, Bob B.	Lieut.
Shamrock	McNett, Roy C.	Lieut.
Vernon	Nowlin, Dan R.	Lieut.
Weslaco	Dixon, Robert B.	Lieut.
Yoakum	Suehs, Leon G.	Lieut.

Utah

Deweyville	Perry, Norman L.	Lieut.
Garland	Shurtz, Homer J.	Lieut.
Meadow	Beckstrand, Evan A.	Lieut.
Provo	Marshall, John T.	Lieut.
Salt Lake City	Fallon, Walter W.	Lieut.

Vermont

Brandon	Conklin, Richard K.	Lieut.

Virginia

Arlington	DeShazo, George S.	Cmdr.
Arlington	Sheals, Ralph A., Jr.	Lieut.
Floyd	Conduff, Joseph H.	Lieut.
Norfolk	Sedel, N. G.	Lt. Cmdr.
Richmond	Allen, Frank C.	Lieut.
Richmond	Thistlethwaite, G. E.	Lieut.
Roanoke	Cannaday, J. V.	Lt. Cmdr.
Stewart	Handy, Douglas Q.	Lieut.
Warrenton	Anderson, A. R., Jr.	Lieut.
Wytheville	Jackson, Robert F.	Lieut.

Washington

Auburn	Neely, Howard E.	Lt. Cmdr.
Olympia	O'Leary, Jerry	Lieut.
Prosser	Melgaard, V. L.	Lt. Cmdr.
Seattle	Bendickson, C. L.	Lieut.
Seattle	Burrell, Robert A.	Lieut.
Seattle	Shuler, Elmer C.	Lt. Cmdr.
Seattle	Smith, Bruce B.	Lieut.
Seattle	Warhanik, S. A.	Lt. Cmdr.
Spokane	Hyde, Vernon E.	Lieut.
Spokane	Lewis, John A.	Lieut.
Spokane	White, H. C.	Lt. Cmdr.
Vancouver	O'Banion, James H.	Lieut.
Yakima	Korach, Mike M.	Lieut.

West Virginia

Beckley	Abrams, David A.	Lieut.
Charleston	French, William C.	Lieut.
Charleston	Mayne, Thomas W.	Lieut.
Fairmont	Brown, Walter B.	Lieut.
Fort Gay	McClure, Laben T.	Lieut.
Glen Jean	Giglia, James V.	Lieut.
Point Pleasant	Cottrill, Clarence C.	Lieut.
Wheeling	Joseph, Michael J.	Lieut.

Wisconsin

Algoma	Blahnik, Gilbert J.	Lieut.
Allenton	Herman, Oliver H.	Lieut.
Baraboo	Bentz, Lloyd J.	Lieut.
Berlin	Lang, Richard T.	Lieut.
Centuria	Olson, DeForest J.	Lieut.
Darlington	Connelly, James J.	Lieut.
Eau Claire	George, Thomas J.	Lieut.
Elkhart Lake	Loos, William A.	Lieut.
Fond du Lac	Thibadeau, G. J.	Lieut.
Goodman	D'Amour, William G.	Lieut.
Green Bay	Gunderson, John R.	Lieut.
Kenosha	Carelli, Edward J.	Lieut.
Kenosha	Flatley, Leo J., Jr.	Lieut.
Loretta	Johnson, Warren A.	Lieut.
Madison	Dickert, Harold R.	Lieut.
Milwaukee	Blech, George	Lieut.
Milwaukee	Copsey, Howard A.	Lieut.
Milwaukee	Hansen, Warren C.	Lieut.
Milwaukee	Lassa, Ralph E.	Lieut.
Milwaukee	Naze, Ferdinand J.	Lieut.
Milwaukee	Olsgard, Waldon H.	Lieut.
Milwaukee	Pelkowski, R. R.	Lieut.
Milwaukee	Petta, Andrew P., Jr.	Lieut.
Milwaukee	Pietruszynski, H. A.	Lieut.
Milwaukee	Sires, Nathan T.	Lt. Cmdr.
Milwaukee	Sweed, Milton J.	Lieut.
Milwaukee	Teplinsky, Jack J.	Lieut.
Milwaukee	Weber, Ward G.	Lieut.
Mineral Point	Stonner, Hadley P.	Lieut.
Mondovi	Solberg, Douglas J.	Lieut.
Monroe	Bennett, D. K.	Lt. Cmdr.
Nekoosa	Bentz, August J.	Lieut.
Sheboygan	Schutte, Edwin H.	Lieut.
Sheboygan Falls	Schmidt, Harold H.	Lieut.
Viroqua	DeLap, Kenneth C.	Lieut.
Wauwatosa	Helz, James V.	Lieut.
Wisconsin Dells	Field, Floyd A.	Lieut.
Wisconsin Rapids	Derksen, Dirk N.	Lieut.

DEATHS

Ackley, E. J., Huntington Park, Calif.; died March 16; aged 67.

Ahrendt, Albert W., Chicago; Chicago College of Dental Surgery, Loyola University; died March 22; aged 44.

Alley, Elwood, St. Louis, Mo.; died January 29; aged 82.

Allworth, James D., Gloversville, N. Y.; Baltimore College of Dental Surgery, University of Maryland; died February 17.

Arends, Frederick L., Washington, D. C.; School of Dentistry, Georgetown University, 1922; died February 11; aged 42.

Benson, Bert, Gardena, Calif.; died in January; aged 41.

Brady, William Francis, Morris, N. Y.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1905; died March 3.

Breckenridge, Charles J., Chicago; Dental School, Northwestern University, 1897; died March 9; aged 76.

Chilson, H. Lee, Brandenton, Fla.; Dental School, Northwestern University, 1900; died March 16; aged 70.

Coe, J. C., Port St. Joe, Ala.; School of Dentistry, Atlanta-Southern Dental College, Emory University, 1916; died March 1; aged 59.

Conway, Thomas J., Springfield, Mass.; Tufts College Dental School, 1907; died March 7; aged 64.

Coston, Willis A., Kansas City, Mo.; died March 30; aged 84.

Coye, William S., Ogden, Utah; Tufts College Dental School, 1901; died March 12; aged 79.

Cushman, Frank Holmes, Boston; Dental School, Harvard University, 1915; died February 28; aged 55.

Davis, Francis Leonard, Waxahachie, Texas; died March 7.

Dawson, Roy B., Berkeley Springs, W. Va.; died in February; aged 57.

Donahoe, John M., Superior, Wis.; Chicago College of Dental Surgery, Loyola University, 1902; died March 5; aged 72.

Dudley, Harry Orsborne, Flemingsburg, Ky.; School of Dentistry, University of Louisville, 1898; died March 18; aged 69.

Duff, Carey Ernest, Lawrenceville, Ill.; School of Dentistry, St. Louis University, 1903; died January 26; aged 65.

Estill, Arthur C., Bridgeport, Nebr.; School of Dentistry, Creighton University, 1908; died March 13; aged 71.

Fenton, O. M., Henryetta, Okla.; died in January.

Gaffney, Thomas Wellington, Seattle; School of Dentistry, North Pacific College of Oregon, 1924; died February 25; aged 55.

Gagnon, Edward Joseph, Manteno, Ill.; Chicago College of Dental Surgery, Loyola University, 1916; died February 8; aged 62.

Gallagher, Edward T., Alton, Ill.; School of Dentistry, Washington University, 1917; died February 12.

Gernon, James D., Philadelphia; School of Dentistry, University of Pittsburgh; died March 1; aged 57.

Gilbert, O. C., Seattle; Dental School, Northwestern University, 1901; died March 3.

Gilson, Bernard F., New York City; died February 18; aged 56.

Goldstein, Herman, Charleston, W. Va.; died March 24; aged 37.

Goodhue, Ray L., Macksville, Kan.; School of Dentistry, Kansas City-Western Dental College, University of Kansas City, 1919; died September 7; aged 49.

Hale, John M., Mt. Vernon, Ind.; School of Dentistry, Vanderbilt University, 1897; died March 1; aged 80.

Hallock, Charles H., Los Angeles; died January 13; aged 73.

Hampton, Christy G., Monroe City, Mo.; School of Dentistry, Washington University, 1892; died February 2; aged 77.

Harness, L. C., Oklahoma City; School of Dentistry, Kansas City-Western Dental College, University of Kansas City, 1919; died February 20.

Herring, L. O., Charlotte, N. C.; Baltimore College of Dental Surgery, University of Maryland; died January 5; aged 43.

Hickey, David L., Covington, Ky.; Ohio College of Dental Surgery, University of Cincinnati, 1910; died February 1; aged 62.

Hill, George E., Cape Elizabeth, Orc.; Baltimore College of Dental Surgery, University of Maryland; died January 18; aged 69.

Hoffman, C. F., Falls City, Nebr.; School of Dentistry, Creighton University; died March 18.

Hopkins, Herbert C., Washington, D. C.; Dental School, George Washington University, 1908; died March 20; aged 65.

Horness, Louis C., Oklahoma City; School of Dentistry, Kansas City-Western Dental College, University of Kansas City, 1919; died February 20.

Hunter, Charles F., Palisade, N. J.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1901; died March 27; aged 70.

Husch, Sylvester B., New York City; School of Dental and Oral Surgery, Columbia University, 1904; died February 16; aged 67.

Inman, Ebner L., Clyde, N. Y.; School of Dentistry, University of Buffalo, 1902; died April 7.

Keefe, James Eucherius, Chicago; Chicago College of Dental Surgery, Loyola University, 1887; died March 12; aged 82.

Kibler, E. H., Newberry, S. C.; died in March; aged 65.

Kiess, Henry W., St. Louis, Mo.; died February 9; aged 80.

Klein, Edward, Englewood, N. J.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1925; died in March.

Knight, N. P., Joliet, Ill.; Chicago College of Dental Surgery, Loyola University, 1921; died February 11; aged 61.

Leiser, A. H., San Francisco; College of Dentistry, University of California, 1912; died in March.

Lewandowski, Cornelius C., Chicago; died April 9; aged 40.

McCormick, Herbert V., Tottenville, N. Y.; School of Dentistry, Temple University, 1889; died March 19; aged 78.

McKain, John, Milwaukee; died March 3; aged 38.

Manley, John T., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1919; died March 18; aged 48.

Marshall, W. C., Perry, Okla.; died March 5; aged 76.

Mason, R. Holmes, Macon, Ga.; School of Dentistry, Atlanta-Southern Dental College, Emory University, 1903; died March 29.

Mays, John W., Kiowa, Kan.; School of Dentistry, Kansas City-Western Dental College, University of Kansas City, 1907; died April 1, 1945; aged 60.

Melfi, Anthony Joseph, Columbus, Ohio; College of Dentistry, Ohio State University, 1945; died February 24; aged 23.

Miers, Harry W., Schoharie, N. Y.; School of Dentistry, University of Buffalo; died March 9; aged 55.

Miller, Frederick G., St. Charles, Ill.; Chicago College of Dental Surgery, Loyola University, 1898; died January 29; aged 68.

Millington, R. E. F., Philadelphia; School of Dentistry, Temple University, 1914; died in March.

Mitchell, Eden E., Oklahoma City; School of Dentistry, Kansas City-Western Dental College, University of Kansas City, 1905; died February 2; aged 70.

Moore, William H., Philadelphia; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1888; died March 24; aged 80.

Mueller, Carl W., Peoria, Ill.; died February 21.

Nolen, John Cody, Muskegon, Mich.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1892; died January 20; aged 80.

Nyer, W. M., Weatherly, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1898; died February 7.

O'Brien, Mallory, Mt. Rainier, Md.; Baltimore College of Dental Surgery, University of Maryland; died March 26; aged 55.

Powers, Frank G., Marshall, Mich.; School of Dentistry, University of Michigan, 1896; died January 26; aged 75.

Prudhomme, Joseph H., Bermuda, La.; died March 15; aged 65.

Ransom, Walter, Seattle; School of Dentistry, North Pacific College of Oregon; died February 14; aged 54.

Reiber, Frank J., Paw Paw, Mich.; Chicago College of Dental Surgery, Loyola University, 1905; died in March; aged 71.

Reynolds, Arthur L., Canastota, N. Y.; School of Dentistry, University of Buffalo, 1904; died March 29; aged 70.

Robbins, Walter B., Braintree, Mass.; Tufts College Dental School, 1907; died March 13; aged 60.

Rowland, Elliott H., San Bernardino, Calif.; School of Dentistry, Kansas City-Western Dental College, University of Kansas City, 1914; died March 8; aged 55.

Rue, Alonzo W., Alton, Mo.; School of Dentistry, Washington University, 1896; died March 31; aged 70.

Schurig, Hugo, New York City; School of Dentistry, Temple University, 1889; died February 21; aged 85.

Schwarz, Jacob, New York City; College of Dentistry, New York University, 1909; died February 3.

Shattuck, Frank L., Birmingham, Mich.; School of Dentistry, University of Detroit, 1886; died March 11; aged 80.

Shaw, J. W., Roseville, Ohio; Dental School, George Washington University, 1903; died March 3; aged 77.

Smith, Frederick S., Grafton, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1903; died March 10.

MEETINGS AND ANNOUNCEMENTS

Meetings of State Societies

State	*Date*	*Place*	*Secretary*	*Address*
Alabama			A. M. Sellers	812 Empire Bldg., Birmingham
Arizona			R. D. McDonald	601 Valley Bk. Bldg., Mesa
Arkansas			I. M. Sternberg	Merchants Bk. Bldg., Ft. Smith
California			L. E. Linehan	450 Sutter, San Francisco
Southern California	Sept. 16-18	Los Angeles	R. L. Borland	Rm. 615, 1052 W. 6th St., Los Angeles
Colorado			M. R. Markley	Republic Bldg., Denver
Connecticut			E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			R. H. Stucklen	1003 Delaware Ave., Wilmington
District of Columbia			M. E. Colvin	1726 21st St., N.W., Washington
Florida	Nov. 11-13	Palm Beach	A. J. Fillastre	603 Marble Arcade, Lakeland
Georgia			R. H. Murphy	605 Bankers Ins. Bldg., Macon
Hawaii	Oct. 29-Nov. 3	Honolulu	J. H. Dawe	P.O. Box 39, Honolulu
Idaho			M. Kirkpatrick	Caldwell
Illinois	Sept. 16-19	Chicago	L. H. Jacob	Jefferson Bldg., Peoria
Indiana			E. E. Ewbank	Kingman
Iowa			A. N. Humiston	417 Higley Bldg., Cedar Rapids
Kansas			F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky			J. L. Walker	640 Barbee Way S., Louisville
Louisiana			J. S. Bernhard	407 Med. Arts Bldg., Shreveport
Maine			A. H. Garcelon	State House, Augusta
Maryland			P. A. Deems	835 Park Ave., Baltimore
Massachusetts			P. E. Adams	106 Marlborough St., Boston
Michigan			F. Wertheimer	Mich. Dept. of Health, Lansing
Minnesota			L. M. Cruttenden	498 Lowry Med. Arts Bldg., St. Paul
Mississippi			O. L. Colee	Magnolia
Missouri	May 12-14, 1947	Kansas City	C. W. Digges	Exchange Natl. Bk. Bldg., Columbia
Montana			F. E. Laing	401 Hart-Albin Bldg., Billings
Nebraska			F. A. Pierson	Fed. Securities Bldg., Lincoln
Nevada			R. Atkinson	503 Med. Dent. Bldg., Reno
New Hampshire			F. E. Williams	814 Elm St., Manchester
New Jersey			J. G. Carr	223 E. Hanover St., Trenton
New Mexico			J. S. Eilar	1st Natl. Bk. Bldg., Albuquerque
New York			C. A. Wilkie	1 Hanson Pl., Brooklyn
North Carolina			C. W. Sanders	Benson
North Dakota			F. A. Maides	Grand Forks
Ohio	Nov. 11-13	Columbus	E. C. Mills	220 S. Cassady Ave., Columbus
Oklahoma			E. Wise	Med. Arts Bldg., Tulsa
Oregon			W. H. Hurley	Selling Bldg., Portland
Panama Canal Zone			I. Buchin	Post Dent. Surgeon, APO 834, c/o PM, New Orleans
Pennsylvania			E. R. Aston	421 Market St., Kingston
Philippine Islands			G. A. Carreon	9 Broadway, 3rd St., N. Manila
Puerto Rico			J. O. Porrate	16 Caribe, Santurce
Rhode Island			C. F. McKivergan	102 Waterman St., Providence
South Carolina			P. B. Hair	701 Andrews Bldg., Spartanburg
South Dakota			E. W. Elmen	Sioux Falls
Tennessee			E. J. Justis	Exchange Bldg., Memphis
Texas			W. Ogle	313 Med. Arts Bldg., Dallas
Utah			M. G. Kuhre	Trib.-Tel. Bldg., Salt Lake City
Vermont			J. A. Larrow	Middlebury
Virginia			J. E. John	804 Med. Arts Bldg., Roanoke
Washington			F. J. Dingler	1502 Med. & Dent. Bldg., Seattle
West Virginia			M. H. Nicholson	321 Cal & Coke Bldg., Bluefield
Wisconsin			R. A. Mason	964 N. 27th St., Milwaukee
Wyoming			J. D. McNiff	Laramie

Meetings of State Boards of Dental Examiners

Arizona	Oct. 2	Phoenix	R. K. Trueblood	25 N. Second Ave., Glendale
California	Aug. 5	San Francisco	K. I. Nesbitt	515 Van Ness Ave., San Francisco
	Sept. 16	Los Angeles		
Florida	Oct. 28-31	Jacksonville	A. W. Kellner	P.O. Box 155, Hollywood
North Dakota	July 8-11	Fargo	R. Krause	Bismarck
Ohio	July 22-24 (practical) July 23 (dental hygienists) July 25-27 (theory)	Columbus	E. D. Lowry	70 E. State St., Columbus 15
Oregon	Oct.28-Nov.2	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
South Dakota	Sept. 1-5	Sioux Falls	T. E. Burrington	P.O. Box 5, Rapid City
Wisconsin	July 8-12	Milwaukee	S. F. Donovan	Tomah

Other Meetings

Name	*Date*	*Place*	*Secy. or Chm.*	*Address*
American Association of Orthodontists	Sept. 30-Oct. 3	Hotel Broadmoor, Colorado Springs	Max E. Ernst Secy.	1250 Lowry Med. Arts Bldg., St. Paul
American Dental Assistants Association	Oct. 14-16	Roney Plaza Hotel, Miami Beach	Aileen Ferguson Secy.	709 Centre St., Jamaica Plain 30, Mass.
American Dental Hygienists' Association	Oct. 14-16	Alcazar Hotel, Miami Beach	A. R. Fisk Secy.	1704 N. Troy St., Arlington, Va.
American Society of Oral Surgeons	Oct. 9-12	Roney Plaza Hotel, Miami Beach	Harry Bear Secy.	1112 E. Clay St., Richmond 19, Va.
National Board of Dental Examiners	Sept. 9-11		Gordon L. Teall Secy.	Box 71, Hiawatha, Kan.
National Dental Association	Aug. 19-23	Louisville	J. A. Jackson Secy.-Treas.	Charlottesville, Va.
Montreal Dental Club	Oct. 23-25	Mount Royal Hotel, Montreal	M. L. Donigan Chm.	Drummond Med. Bldg., 1414 Drummond St., Montreal
Wisconsin Dental Economic Study Club	Aug. 23-24	Madison	L. R. McCormick Publicity Chm.	2609 University Ave., Madison

Internships, Externships, Residencies and Fellowships

The Children's and Infants' Hospital (a Unit) of Boston. Address Paul K. Losch, 300 Longwood Ave., Boston.

The Children's Memorial Hospital, Chicago. Administrator, Mabel W. Binner, 707 Fullerton Ave., Chicago.

Eastman Dental Dispensary, Rochester, N. Y. Director, Harvey J. Burkhart.

Fellowships for Research and Graduate Work in the Dental Sciences, University of Rochester. Dean, George H. Whipple.

International Grenfell Association, Staff Selection Committee, 56 Fifth Ave., New York City.

Jewish Sanitarium and Hospital for Chronic Diseases. Director, Leonard Kohn, Dental Division, East Forty-Ninth St. and Rutland Road, Brooklyn 3, N. Y.

Joseph Samuels Dental Clinic of the Rhode Island Hospital, Providence. Director, Ernest A. Charbonnel.

Richmond Freeman Memorial Clinic for Infants and Children, Dallas, Texas. Executive Director, Dora B. Foster, 3617 Maple Ave., Dallas.

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